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**An investigation into cognitive mechanisms as a developmental pathway for
children's involvement in bullying and adjustment problems**

Sania Shakoor

PhD Thesis, 2012

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ABSTRACT

This thesis investigates cognitive mechanisms underlying youths' vulnerability for involvement in bullying and developing adjustment problems. The aim of this thesis was threefold: (1) investigate whether early cognitive functioning acts as a developmental marker for children's later involvement in bullying; (2) investigate the cognitive processing of bullied children and whether these skills were associated with adjustment problems; (3) investigate whether early cognitive functioning acts as a differential marker for bullies and non-bullies who have other antisocial behaviour problems. Participants were members of the Environmental-Risk (E-Risk) Longitudinal Twin Study, a nationally representative sample of 2,232 children and their families, and the Dunedin Multidisciplinary Health and Development Study, a longitudinal birth cohort of 1037 children born in Dunedin, New Zealand. Using multiple informant reports, measures of bullying, antisocial behaviours, cognitive functioning, child-specific and family factors were collected during childhood, adolescents and adulthood.

Poor theory of mind (ToM) in early childhood predicted becoming a victim or bully-victim in adolescence over and above child-specific and family factors. For bullies, the risk of having poor ToM was overridden by socioeconomic deprivation and child maltreatment. Bullied children reported biased interpretation of their environments when compared to their non-bullied co-twin. Children who used biased attribution styles when interpreting the cause of negative events had higher levels of adjustment problems. Bullies did not differ in their early cognitive processing, temperament and family environment from children with high antisocial behaviours, but did from children with moderate antisocial behaviours. Being a bully or having antisocial behaviours predicted adjustment problems in adolescence and adulthood. Being a bully had an independent effect on substance use in adolescence and emotional problems in adulthood over and above the risk posed by having antisocial behaviours.

Findings from this thesis identify cognitive functioning as an early developmental marker for children's involvement in bullying and a mechanism that may be negatively affected by children's bullying experiences. Supporting positive cognitive development throughout childhood may help to reduce children's risk of being involved in bullying and maintain healthy cognitive processing techniques that promote mental wellbeing.

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PUBLICATIONS

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Shakoor, S., Jaffee, S., Andreou, P., Bowes, L., Ambler, A.P., Caspi, A., Moffitt, T.E., Arseneault, L. (2011) Mothers and children as informants of bullying victimisation: Results from an epidemiological cohort of children. *Journal of abnormal child psychology* 39: 379-387

Ouellet-Morin, I., Odgers, C.L., Danese, A., Bowes, L., **Shakoor, S.**, Papadopoulos, A.S., Caspi, A., Moffitt, T.E., & Arseneault, L. (2011). Blunted cortisol responses to stress signal social and behavioural problems among maltreated/bullied 12 year-old children. *Biological Psychiatry* 70: 1016-1023

Ouellet-Morin, I., Danese, A., Bowes, L., **Shakoor, S.**, Ambler, A.P., Pariante, C., Papadopoulos, a., Caspi, A., Moffitt, T.E., Arseneault, L. (2011) A discordant MZ twin design shows blunted cortisol reactivity among bullied children. *Journal of the American Academy of Child and Adolescent Psychiatry* 50: 574-582

Arseneault L, Bowes L, **Shakoor S** (2010) Bullying victimisation in youths and mental health problems: 'Much ado about nothing'? *Psychological Medicine* 40: 717-729.

Riazi A, **Shakoor S**, Dundas I, Eiser C, McKenzie SA. (2010) Health-related quality of life in a mixed-ethnic clinical sample of obese children and adolescents. *Health and Quality of Life Outcomes*, 8:134-139

Articles in press

Bowes, L., Maughan, B., Ball, H., **Shakoor, S.**, Ouellet-Morin, I., Caspi, A., Moffitt, T.E., & Arseneault, L. (in press) Chronic bullying victimisation across school transitions: The role of genetic and environmental influences. *Development and Psychopathology*

In preparation

Shakoor, S., Jaffee, S.R., Harrington, H., Caspi, A., Moffitt, T.E., & Arseneault, L., (in preparation) Bullies and children with antisocial behaviours: Two peas in a pod?

DECLARATION

The research described in this thesis was undertaken using data collected as a part of the Environmental Risk (E-Risk) Longitudinal Twin Study, the TEDS Peers (Promoting Enjoyable and Engaging Relationships at School) Study and the Dunedin Multidisciplinary Health and Development Study.

The E-Risk Study and TEDS Peers Study is funded by the Medical Research Council (MRC; G9806489 and G1002190). Additional support was provided by the Economic and Social Research Council (RES-177-25-0013), the British Academy, the Nuffield Foundation, the Jacobs Foundation, the US National Institute of Child Health and Human Development (HD061298), and the US National Institute of Mental Health (MH077874). The Dunedin Study is funded by the New Zealand Health Research Council, UK Medical Research Council (G0601483), and the US-National Institute of Aging (AG032282). I received funding for this PhD research from the Medical Research Council.

Data collection and dataset construction for the E-Risk and Dunedin dataset was completed by the E- Risk Study and Dunedin Study teams. I was involved in the selection of measures, data collection and dataset construction for the TEDS Peers Study. I was responsible for generating all hypotheses and research questions addressed in this thesis. I derived all variables, conducted all statistical analyses and wrote all of the chapters. The work presented in this thesis is original and my work, with exception to what has been acknowledged within the text. This thesis has not been submitted for any other degree at any other university.

1 Youth involvement in Bullying

Traditionally viewed as an unpleasant yet normal experience, bullying has often been considered as a rite of passage that most children undergo during their schooling years. However, in recent years this negative childhood experience has been catapulted into the public eye and to the attention of government agencies concerned with children's wellbeing and public health. Increased media attention to cases where bullied children have committed suicide or homicide, has highlighted that bullying is not just an unpleasant experience, but rather one which is associated with adverse consequences. Mirroring this increase in attention, the past decade has seen a flourish of scientific studies being conducted in a bid to gain a better understanding of this phenomenon and those involved not only as the victims but also as perpetrators. Research has focused on a number of components primarily investigating the adversities experienced by children involved in bullying and identifying factors to aid recognition of children who are vulnerable for engaging in bullying behaviours. However an area that still warrants further attention is that of underlying mechanisms or processes involved in the manifestation of bullying behaviours and their translation into adjustment problems. Identifying such mechanisms will both aid in the recognition of children at risk of being involved in bullying, and understanding of the processes through which the experience of bullying leads to adversities such as adjustment problems. Furthermore as it can be difficult to change certain environmental risk factors such as socioeconomic deprivation, understanding the mechanisms involved in the translation of such environmental risk factors upon bullying behaviours may be another avenue interventions can be targeted towards. In this chapter I will first provide an overview of research investigating children's involvement in bullying and the associated risks. I will further continue to discuss underlying theories and mechanisms involved in understanding bullying behaviours.

1.1 Defining bullying behaviours

Distinct from other forms of aggressive behaviours, bullying is characterised by repeated hurtful actions between peers where a power imbalance exists. The repetition of these behaviours overtime results in a pattern of interactions being established between victims and bullies. These interactions are characterised by factors that encompass a power imbalance (i.e. physical strength, age or popularity), whereby it is

difficult for the victim to defend him or herself. These behaviours are manifested in two ways (Olweus, 1993, 1994); (1) direct, which includes acts of aggression and assault that are conducted in a relatively open manner, and (2) indirect, which includes behaviours such as the exclusion, social isolation and manipulation of friendship groups. A recent addition to bullying behaviours, as a result of the advances in technologies, is cyberbullying. The term refers to ‘an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself’ (Smith et al., 2008). Examples of which include social websites (e.g. facebook), mobile phone text and video messaging, and emails. Studies have reported rates ranging between 2 to 20% of bullying experiences being cyberbullying, with text messaging being the most prevalent form (Smith et al., 2008). Bullying therefore is no longer constrained to the school environment, but rather an experience that can cause prolonged distress and is increasingly difficult to escape from.

Although there is a general consensus amongst researchers regarding the definition of bullying, the degree to which children perceive bullying in accordance with Olweus’s definition has been questioned. There is some evidence to suggest that children’s definition of bullying rarely includes all three criteria of repetition, power imbalance and intentionality, as proposed by Olweus. For the majority of children greater emphasis is given to negative behaviours when defining bullying, with very little mention of intentionality, repetition and power imbalance (Vaillancourt et al., 2008). In addition, research has identified age trends amongst conceptualisation of bullying. Younger children are more likely to equate physical aggression with bullying (Smith & Levan, 1995) in comparison to older children who are more likely to extend their definition of bullying by including more subtle forms, such as exclusion and verbal aggression (Smith et al., 2002).

In an empirical study conducted by our research group using data from the Environmental Risk Longitudinal Twin Study, we demonstrated that when reporting on being bullied during early secondary school, 99% of 12 year old children recounted the behaviours to have been perpetrated by peers, 61% recalled bullying to have been experienced repeatedly over time, and 81% reported evidence of a power imbalance. A total of 85% of children reported at least 2 of the criteria for victimisation (Shakoor et al., 2011). Thus suggesting that although children may not be able to assign behaviours

into the criterion suggested by Olweus, when conceptualising and reporting bullying incidences, factors of peer perpetration, repetitiveness and power imbalance are all taken into consideration.

1.2 Prevalence rates and gender differences

On average 13% of children and adolescents have reported to be involved in bullying as victims, 11% as bullies and 4 % as bully-victims (children who have been bullied and have bullied others) each year worldwide (Craig et al., 2009), with a general decline in prevalence from late childhood to adolescence (Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008a; Camodeca, Goossens, Terwogt, & Schuengel, 2002; Pellegrini & Long, 2002). Interestingly prevalence rates have been reported to vary considerably across countries with 5% in Sweden to 36% in Lithuania being victims, and 3% in Norway to 20% in Latvia being bullies (Craig et al., 2009). These differences may be due to the methodology used to collect data or the conceptualisation of bullying by studies across different countries. For example a study of terms used to describe bullying across 14 countries, found that children more closely associate ‘bullying’ with physical and verbal aggression rather than social exclusion (Smith et al., 2002). Moreover, this difference may help to explain why some studies have reported boys more often as bullies and victims in comparison to girls (Nansel et al., 2001; Perren & Hornung, 2005; Scheithauer, Hayer, Petermann, & Jugert, 2006). In contrast, studies that included measures of indirect victimisation such as social exclusion, found that a larger number of girls reported being victims of bullying (Crick & Bigbee, 1998). In line with the type of bullying behaviour being a possible contributor towards observed gender differences, researchers have found direct bullying to be more frequent amongst boys (i.e. physical harm), indirect bullying more frequent amongst girls (i.e. spreading rumours) (Bjorkqvist, Lagerspetz, & Kaukiainen, 1992; Card, Stucky, Sawalani, & Little, 2008; Rivers & Smith, 1994) and no gender differences in cyberbullying (Slonje & Smith, 2008; Ybarra & Mitchell, 2004).

1.3 Assessing bullying behaviours

To date a number of methods, varying in techniques and informants, have been used to measure bullying behaviours. Utilising the wealth of data available by naturalistic observations of behaviours, bullying has been assessed using direct observations of children in their normal day-to-day social environments such as the playground or classroom (Pepler & Craig, 1995). Using audio-visual equipment researchers record and

code instances of bullying. Although this method does allow for the observation of bullying behaviours as they occur in naturalistic circumstances, this method is not suited for large cohort studies due to the large amounts of time and man power involved.

Sociometric assessments have utilised the presence of peers in bullying situations and used peer nominations as an alternative method. Children are presented with the names of other class members, and asked to nominate who fit the description of a 'victim' a 'bully' or a 'bully-victim' (Boivin & Hymel, 1997). This is further extended by asking children to identify 'victims', 'bullies' or 'bully-victims' in relation to themselves, thus making peer nominations an ideal tool for measuring the dyadic relationships between victims and bullies (Veenstra et al., 2007). Although peer nominations are a valuable tool in collecting data from multiple informants simultaneously, they do not provide information with regards to the severity of the experience or nature of the bullying experiences.

An alternative and more widely used method for assessing bullying in recent research are questionnaires, where respondents rate their own experiences with bullying (Maynard, 1997; Olweus, Jimerson, Swearer, & Espelage, 2009). Although questionnaires represent a straightforward method for collecting detailed information on different types of bullying behaviours and the severity of the experience, they also have their limitations (Salmivalli, Peets, Rubin, Bukowski, & Laurens, 2009). For example, although children provide self-perceptions and global views of their experiences across various settings, relying on young children as informants can be problematic. Some may be reluctant to report painful or traumatic experiences, raising ethical concerns (Ladd & Kochenderfer-Ladd, 2002; Olweus, et al., 2009). Furthermore, young children may not have yet developed adequate cognitive abilities to comprehend the concepts being assessed (Measelle, Ablow, Cowan, & Cowan, 1998), or recognise their involvement in certain activities. Alternative informants include parents, teachers and peers. Parents are considered as a viable alternate informant as young victims of bullying are more likely to report bullying incidents to someone at home than to a school teacher (Whitney & Smith, 1993). However, as parents are largely dependent on being informed about bullying incidents, rather than witnessing them, as such events occur most frequently outside the home, they may not be aware of all instances. Alternatively, teachers may have the opportunity to witness instances of bullying on the playground or in the

classroom, but may however be unaware of occurrences of bullying outside of school such as in the neighbourhood. Peers are likely to be aware if another pupil is involved in bullying because they are often present in children's environments where bullying takes place, such as school bathrooms, changing rooms and locker areas. However, similar to the use of self-reports from young children, peer reports may be an unreliable source of information during the early schooling years, as children may not yet have developed the cognitive abilities to distinguish bullying experiences or remember such events. Furthermore, more subtle forms of bullying may bypass peers' recognition (Ladd & Kochenderfer-Ladd, 2002; Smith & Levan, 1995).

As both child and adult reports have some drawbacks, it remains unclear who should be considered as an adequate informant of children's bullying experiences. In an attempt to address this concern, the comparability of mothers' and children's reports of bullying victimisation was assessed using data from the E-Risk Study (Shakoor et al., 2011). Results showed that mothers and children are valid and reliable informants of bullying victimisation. Both informants reported information that adhered to the definition of victimisation, similar association with children's emotional and behavioural problems, and similar estimates of genetic and environmental influences on victimisation. Mothers and children tended to agree with one another about who was bullied in primary and secondary school, but they failed to agree completely, therefore collecting data from multiple informants is ideal to capture all instances of victimisation. However, in the absence of child self-reports, mothers can be considered as a viable alternative, and vice versa.

Although there is evidence to suggest that multiple informants are equally reliable and valid (Shakoor et al., 2011), the low levels of agreement across different informants (Ronning et al., 2009; Wienke Totura, Green, Karver, & Gesten, 2009) suggests that bullying victimisation may be specific to different environments or settings. Therefore, when using questionnaires and especially with young children, researchers may consider collecting data from multiple informants to capture all instances of bullying victimisation.

1.4 Aetiology of bullying behaviours

Investigations into the aetiology of bullying behaviours has shown that genetic influences accounted for 73% of the variance in victimisation and 61% in bullying

perpetration. Findings demonstrated victims and bullies to have a genetic susceptibility towards being involved in bullying, which is expressed when they are exposed to certain environments (Ball et al., 2008). The remaining variances in bullying victimisation and perpetration were explained by environmental factors therefore supporting other studies that have shown that the environment also influences children's risk of being involved in bullying (Brendgen et al., 2008). For example, as a substantial proportion of bullying behaviours occur within the school playground or classroom, it is possible that factors associated with the school environment may contribute. Studies have shown that school characteristics such as overcrowding and the number of children receiving free school meals increase children's risk of being bullied and bullying others (Barnes, Belsky, Broomfield, Melhuish, & the N.R.T, 2006; Bowes et al., 2009).

Empirical cross sectional and longitudinal studies have also shown family factors to play a prominent role in children's risk of being involved in bullying. Studies investigating factors relating to the family context have shown that children involved in bullying as victims and perpetrators are more likely to have parents with high levels of depression (Beran & Violato, 2004). They are more likely to have been maltreated at home (Shields & Cicchetti, 2001), have parents who are less caring and belong to families that are less functional (Rigby, 1994). These children are also found to be exposed to greater levels of inter-parental physical violence and conflict (Baldry, 2003) and belong to deprived socioeconomic backgrounds (Alikasifoglu, Erginoz, Ercan, Uysal, & Bayrak-Kaymak, 2007; Wolke, Woods, Stanford, & Schulz, 2001), in comparison to children not involved in bullying behaviours. Furthermore, there is some evidence to suggest that exposure to early negative family factors contribute to children's involvement in bullying over and above other contributory factors. For example, the E-Risk Study has shown that exposure to domestic violence and maltreatment predisposes children to become involved in bullying over and above the risk posed by children's early emotional and behavioural problems (Bowes et al., 2009). Factors in children's families can therefore increase their risk of being involved in bullying behaviours over and above children's personal characteristics.

Individual characteristics such as low self-regard, low self-esteem, being less physically attractive and overweight, have also been found to be associated with children's risk of being bullied and bullying others (Egan & Perry, 1998; Guerra, Williams, & Sadek, 2011; Janssen, Craig, Boyce, & Pickett, 2004). Moreover, longitudinal studies have

shown that children with emotional problems such as depression and anxiety have an increased risk of being bullied in childhood (Arseneault et al., 2006; Hodges & Perry, 1999; Kaltiala-Heino, Frojd, & Marttunen, 2009) and bullying others (Sourander, Helstela, Helenius, & Piha, 2000). A meta-analytical review of 11 longitudinal studies examining the association between victimisation and early emotional problems found early emotional problems to have a moderate effect of up to 0.41 upon children's risk of being victimised by their peers over and above the effect of early peer victimisation (Reijntjes, Kamphuis, Prinzie, & Telch, 2010). Similarly, studies have also shown that having behavioural problems such as aggressiveness and delinquent behaviours has a moderate effect upon children's risk of being victimised by their peers (Arseneault et al., 2006; Reijntjes et al., 2011) and bullying others (Jansen, Veenstra, Ormel, Verhulst, & Reijneveld, 2011; Sourander et al., 2000). Studies have shown that aggressive behaviours in children as young as toddlers places them at an increased risk of experiencing peer rejection and victimisation in early schooling years (Barker et al., 2008b; Ladd & Troop-Gordon, 2003; Snyder et al., 2003). The mechanisms through which emotional and behavioural problems influence children's and adolescents' risk of being victimised by their peers and victimising others is not clear. Anxious and depressed children may send signals of difficulties in being able to negotiate conflicts or stand up for themselves, and thus be viewed as easy targets for threats and abuse from other children. On the other hand aggressive children may attract negativity and hostility from other children due to the provocative nature of their behaviours. Children with emotional or behavioural problems may also victimise others as a way of dealing with their feelings of frustrations or expressing their problems.

Children's involvement in bullying is thus not a random occurrence. Rather it is one that is influenced by a number of genetic and individual characteristics (e.g. personality traits), as well as environmentally mediated factors (e.g. home and school factors) (Mooij, 1998; Olweus, 1984; Smith, Bowers, Binney, Cowie, & Duck, 1993).

1.5 Theories and mechanisms underlying children's involvement in bullying

It is evident that a number of factors increase children's vulnerabilities for being involved in bullying. In a bid to further understand the aetiology of bullying behaviours, how individual and environmental factors translate into a risk of involvement in bullying, and to further inform intervention schemes, a number of theories and models have been proposed.

Children's involvement in bullying is influenced by the interplay of individuals with their environments and those who reside within them. A model that takes this into consideration is the socio-ecological model. It proposes that human behaviour can be understood as a function of the individual's interactions with his or her environment (Bronfenbrenner, 1979). Human behaviour is considered to consist of a number of elements that include one's immediate social environment (i.e. social relationships), the wider social environment which directly impacts one's development (i.e. peer groups, home and school environment), events which occur (life events, behaviours of others) and factors which remain consistent and exist within one's culture as a whole (i.e. SES) (Espelage & Swearer, 2010). As there is a strong body of evidence that supports the role of the environment and the individual as antecedents of children's involvement in bullying (Arseneault, Bowes, & Shakoor, 2010; Farrington & Baldry, 2010), this model aids in one's understanding of bullying. Moreover it emphasises the importance for future research to use multi-dimensional models that simultaneously account for environmental and individual factors when investigating bullying behaviours

The importance of the caregiver in children's risk for being involved in bullying has been documented with studies showing that children who experience negativity from their caregivers i.e. low levels of maternal warmth (Bowes et al., 2009) and maltreatment (Shields & Cicchetti, 2001), are at increased risk of being involved in bullying behaviours. The translation of children's relationship with their caregivers into a risk of bullying and victimisation can be understood using the attachment theory. This proposes that the early childhood relationship between a caregiver and child acts as a model for the child's future relationships and expectations of behaviours from others (Bowlby, 1969). For example, an 'insecurely attached' child who has failed to establish a secure bond with his or her caregiver due to being raised by an insensitive, unresponsive and inconsistent caregiver, is conditioned to expect similar behaviours from others, and may consequently handle new situations with distress and aggression. In contrast, a 'securely attached' child who has developed a secure bond with their caregiver due to being raised by a sensitive and responsive carer is conditioned to expect consistent and sensitive interactions and learns to approach new situations with confidence (Espelage & Swearer 2010). Therefore children's attachment styles can influence their interactions with their peers and consequently contribute towards their risk of being involved in bullying behaviours. Empirical findings have shown that

children with insecure attachment styles are more likely to engage in withdrawn or negative peer interactions compared to securely attached children who are more likely to have pleasant relationships, be more sociable and cooperative with the peers (Ladd 1992). Children with 'insecure' attachments styles are at an increased risk of engaging in bullying behaviours (Troy and Sroufe 1987) and overall share more characteristics with bullies (Perry, Hodeges and Egan 2001).

Another theory that has been used to help understand the aetiology of bullying is the social learning theory (Bandura, 1978), which suggests that children learn their behaviours by modelling the actions of others and through the positive reinforcement of their behaviours. For example, children who are exposed to negative behaviours such as aggression in the home or school (i.e. domestic violence or abuse) are more likely to be aggressive and abusive towards others because they view these behaviours to be normative responses to situations or other people's behaviours (Manly, Kim, Rogosch, & Cicchetti, 2001). Alternatively children who are exposed to domestic violence or abuse may model their behaviour upon the parent who is the victim, and learn to display behaviours that are associated with being a victim, thus resulting in being viewed as easy targets for victimisation. A link between exposure to violence in the home (i.e. domestic violence, physical abuse) and bullying has been supported by empirical studies which have shown that children who bully others or have been victimised at school have parents who tend to be aggressive towards one and another and towards the child (Baldry, 2003; Bowers, Smith, & Binney, 1994; Bowes et al., 2009; Shields & Cicchetti, 2001). Compared to children who have not witnessed violence in the home, children who have are three times more likely to be involved in direct aggression (i.e. hitting, direct bullying) and two times more likely to be involved in indirect aggression (i.e. spreading rumours, excluding and manipulating friendship groups (Dauvergne & Johnson, 2001). The notion of environmental and family factors often being used by children to model their own behaviours has been further supported by a study that found that children who were exposed to positive adult role models were less likely to become bullies. Children who were sometimes or frequently slapped or hit when breaking a rule at home, spent time without an adult around and were exposed to negative peer influences reported higher levels of bullying behaviours middle school students (Espelage, Bosworth, & Simon, 2000).

1.6 Involvement in bullying and adjustment problems

Bullying is a fairly stable type of behaviour and stressor during childhood (Barker et al., 2008a; Bowes et al., in press); Marina Camodeca, et al., 2002; Scholte, Engels, Overbeek, de Kemp, & Haselager, 2007). Studies have reported stability rates as high as 25% for bullies and 15% for victims across a four year period (Kumpulainen, Räsänen, & Henttonen, 1999), thus illustrating that for a substantial proportion of children, the experience of bullying covers a large proportion of their childhood, and may consequently impact the development of mental and physical health.

Globally children involved in bullying as bullies and victims have reported increased levels of peer rejection and dislike (Boulton & Smith, 1994; Scholte et al., 2007), difficulties with schoolwork and truancy (Murray-Harvey & Slee, 2010; Smith, 2000). They report elevated levels of emotional and behavioural problems (Arseneault et al., 2006; Kumpulainen & Rasanen, 2000; Nansel et al., 2001; R. Veenstra et al., 2005) self-harm and suicidality (Barker et al., 2008a; Fisher et al., 2012; Herba et al., 2008; Klomek et al., 2009) and psychotic symptoms (Arseneault et al., 2011; Kelleher et al., 2008; Schreier et al., 2009).

It is evident that children involved in bullying experience a number of adjustment problems but whether these are due to their experiences of bullying remains the focus of attention for current researchers. For example, the stress induced by bullying can directly lead to the development of feelings of hopelessness, depression or anger and thus result in adjustment problems. However it may also be the case that children who are already depressed or aggressive evoke bullying experiences through their portrayal as easy targets or biased interpretations of reciprocal interactions with their peers that result in acts of aggression. A number of researchers have addressed this issue of temporal priority by utilising longitudinal study designs and demonstrating that bullying uniquely contributes towards youth's adjustment problems over and above the effects of pre-existing adjustment problems (Arseneault et al., 2010). In the E-Risk Study, early experiences of being bullied was independently associated with children's development of emotional and behavioural problems, difficulties in adjusting at school and poor pro-social behaviour over and above children's early mental health difficulties prior to entering school (Arseneault et al., 2006). Similar associations have also been found amongst a group of middle school aged children, who reported elevated risks of social problems 10 months after reporting experiences of bullying after controlling for

baseline problems such as aggression and social problems (Kim, Leventhal, Koh, Hubbard, & Boyce, 2006). Similar directional associations have also been observed amongst bullies. Findings from a cohort of adolescents, observed that after a period of one year, bullies reported a two-fold increase in their risk of theft, violent behaviour and binge drinking, after factors such as family conflict, family history of anti-social behaviour, and number of anti-social friends were accounted for (Hemphill et al., 2011).

The independent risk posed by bullying also extends towards suicidal behaviours and symptoms of psychosis. Data collected from the Finnish birth cohort, showed that being frequently bullied at age 8 significantly predicted suicide attempts and suicides by the age of 25 even after controlling for when baseline conduct and depressive symptoms, suggesting that victimisation is an independent predictor of suicide ideation (Klomek et al., 2009). Similarly bullying victimisation during middle childhood, in particular when severe, has also been associated with symptoms of psychosis, over and above effects of early psychopathology, and family adversity (Arseneault et al., 2011; Schreier et al., 2009).

Findings from studies discussed thus far and others demonstrate that bullying has a unique contribution towards children's adjustment problems and that this is not confounded or explained by other environmental factors such as family adversity. However, these studies have failed to take into account the possible contribution of genetic factors. For example there is evidence to suggest that emotional problems such as depression are heritable (Lau & Eley, 2006), therefore elevated levels of depression that are observed amongst children involved in bullying may not be due to their bullying experiences but rather due to their genes. One study that has taken genetic influence into consideration used a monozygotic twin sample discordant on bullying victimisation to test whether differences in bullying victimisation were associated with adjustment problems. As the children in this cohort were monozygotic twins who grew up in the same family, they shared 100% of their genes and family and home environments, therefore allowing for the influence of genetics and shared environmental factors upon adjustment problems to be accounted for (Arseneault et al., 2008). Findings showed that the twin who had been bullied showed significantly higher levels of emotional problems compared to their non-bullied co-twin over and above prior emotional problems. These findings show that bullying victimisation may play a causal

role in the development of new emotional problems, independent of any risk posed by genes and environmental factors shared between twins within a twin pair.

The detrimental effects of being involved in bullying behaviours do not only remain within childhood and adolescence but also further extend to difficulties and problem behaviours in adulthood. A recent study found that men who frequently bullied others in childhood were 3.82 times more likely to be the perpetrators of intimate partner violence (physical or sexual abuse of the female partners) (Falb et al., 2011). In another study, bullying at age 14 predicted a number of violent and negative behaviours in later life. Those who bullied others were twice as likely to be convicted of a violent crime in late adolescence, twice as likely to be drug users and twice as likely to have an unsuccessful life (i.e. relationship problems, employment problems) in adulthood (Farrington & Ttofi, 2011). Interestingly these risks remained over and above other childhood risk factors such as early anti-social behaviour, parental conviction, and social deprivation, which may otherwise contribute towards negative outcomes in adulthood. These findings therefore suggest one of two things; firstly, they provide some evidence for temporal priority and give a tentative indication of a temporal direction; secondly, they may also suggest that bullying may be an early stage of the developmental trajectory towards adult violent behaviours. Thus, not only is the identification of children involved in bullying behaviours important for minimising the detrimental effect of such exposure but also important as an early marker for other difficulties in adulthood.

1.7 Anti-bullying interventions

The immediate and future adversities associated with children's experiences of bullying, highlights the importance for those involved in the well being of youth to formulate successful ways in which involvement in bullying and the development of associated adversities can be minimised. A number of intervention and prevention schemes are being implemented across schools in the United Kingdom and worldwide. These vary in the types of anti-bullying strategies that are used and in their levels of success (Merrell, Gueldner, Ross, & Isava, 2008; Ttofi & Farrington, 2011).

Information collated from research investigating the antecedents of involvement in bullying has highlighted a number of child specific and environmental factors to be important for bullying intervention programs. For example there is evidence to suggest

that rates of bullying and victimisation are increased in school environments where staff are more tolerant or ignore bully behaviours (Dijkstra, Lindenberg, & Veenstra, 2008; C Salmivalli & Voeten, 2004). Furthermore, as children are exposed to interactions with their peers for the largest amounts of time within the school environment, a large proportion of anti-bullying programmes have focused on changes within the school and employed school-wide anti-bullying policies (Olweus & Limber, 2010). Schools are encouraged to increase the monitoring of children in areas where teacher supervision is limited and thus an increased risk of bullying to occur (i.e. playground or school locker room). Programmes are designed to promote positive school and classroom environments, by using counsellor led discussions, posters and other devices to encourage the use of positive language and thinking of students and school personnel. In addition, parents are also involved by being encouraged to join anti-bullying committees involved in implementing policy practices and are kept informed about the policies and their success through regular newsletters and meetings (Olweus & Limber, 2010). Overall studies have found that school-based interventions are effective with on average, decreasing rates of bullying perpetration by 20-23% and victimisation by 17-20% (Ttofi & Farrington, 2011).

Further to targeting the school environment, other programmes have targeted teachers specifically, as within the school environment teachers are the authoritarian adult figures towards whom victims, or the parents of victims may look to for help and intervention. However, research has shown that many teachers are struggling to comply with this role with two out of three students reporting that teachers handle the problems of bullying inadequately (Hazler, 1996). Teachers tend to ignore bullying because they believe they lack the adequate skills and training to be able to successfully intervene (Stephenson & Smith, 1989). Others fear that intervening in a bullying situation may only make the situation worse for the victim or force the problem 'underground' (Hoover, Oliver, & Hazler, 1992; Olweus, 1994). Intervention schemes that attribute a substantial role to teachers and aid in their training have found teachers to report significant increases in knowledge and the use of intervention tools (Newman-Carlson & Horne, 2004).

In contrast to school-wide policies other programmes have used a singular approach by focusing on the victims and bullies individually. Schemes designed to help victims to increase their self-esteem and assertiveness, have found reductions in bullying

experiences (Fox & Boulton, 2003; Kaiser & Rasminsky, 2003; Rigby, 2002). By being more assertive and portraying high self-esteem and self-worth, victims are less likely to be viewed by bullies as easy targets who will not defend themselves. Other approaches have utilised the peer network in a positive manner by using 'buddy' schemes where victims are encouraged to share their experiences with trained peers who act as a means of support (Smith, Ananiadou, & Cowie, 2003). As victims are the recipients of other's aggressive behaviours, it is difficult for them to completely alter or control the behaviours of others, therefore intervention which equip children with adequate tools to cope with the negative experience of bullying victimisation may prove more beneficial. For example studies have shown that bullied children significantly vary from non-bullied children in their coping strategies (Kochenderfer-Ladd & Skinner, 2002; Sandstorm, 2004). As variations in coping strategies have also been linked with adjustment problems (Reijntjes, Stegge, Terwogt, Kamphuis, & Telch, 2006; Sandstorm, 2004), training children with efficient coping skills may help to minimise the negative impact of being bullied.

Intervention policies designed at targeting bullying behaviours, and thus the bullies themselves have included strategies such as deterring bullying behaviours by using punishment such as the withdrawal of privileges, or asking fellow peers to nominate suitable punishments (Mahdavi & Smith, 2002). Others have used 'no blame' strategies where bullies and victims are encouraged to work together to resolve bullying problems (Robinson & Maines, 1997). By working together, bullies are able to improve skills such as empathy and self-control to promote the realisation of the consequences their behaviours hold.

Mirroring the multifaceted nature of bullying behaviours and associated antecedents, interventions demonstrate that the mammoth task of tackling bullying cannot be placed on one group or one environment. Empirical evidence has identified information and training for parents, school conferences, improved playground supervision and disciplinary methods, classroom rules and working with peers, to be the most important components associated with decreasing bullying behaviours (Ttofi & Farrington, 2009). Therefore by employing a multiple component approach which involves families, peers, as well as school personal involved across the different environments children find themselves in (i.e. the school or home), may be the most effective way to minimise bullying behaviours.

Overall as discussed in this chapter, bullying is an early stressful life experience, which has detrimental effects on children's immediate wellbeing and that in later life (Arseneault et al., 2010; Farrington & Ttofi, 2011; Nansel et al., 2004). It is thus not only important to understand its aetiology but also investigate underlying mechanisms that may contribute towards the development of adjustment problems amongst involved youth. Although current intervention schemes are proving successful in reducing children's bullying behaviours, a substantial proportion of children continue to be involved, suggesting that a greater understanding is needed of these behaviours. As bullying behaviours predominantly occur during childhood, developmental processes that contribute towards children's behaviours and social interactions may be an area that warrants further investigation. In particular, cognitive functioning presents itself well as a candidate as cognitive processes underpin children's behaviours and wellbeing (Goswami, Bryant, & Butterworth, 2000). Peer interactions are in part a product of one's environment; therefore cognitive processes involved in decoding environmental cues contribute in shaping children's behaviours and their ability to adjust to negative experiences. By investigating cognitive functioning in relation to bullying and adjustment problems, this may provide an insight into how the processing of environmental cues translates to behaviours. It will further aid in understanding the aetiology of bullying behaviours and associated adjustment problems.

2 The cognitive model of children's behaviour

Many of the modern day conceptualisations of childhood can be traced back to the works of the philosopher John Locke, who viewed the child as a *tabula rasa* (a blank slate). Locke proposed that children come into this world as blank slates, and with guidance can develop into rational adults. The notion of *tabula rasa* has thus lent itself well to advances in the understanding of human behaviour being in part a product of the relationship between the environment, thoughts, actions and conditioning (Harris, 1968). The early years in one's life are thus important for shaping the future adult.

Broadly speaking people tend not to respond directly to the environment per se but rather to their perception and cognitive interpretations of the environment (Brewer & Hewstone, 2004). Cognitive skills thus mediate the effects of external environments on individual's decisions and behaviours and play an important role in shaping future interactions. Defined as a set of processes, which enable the extraction of information from the environment and those who reside within it, cognitive skills include processes such as thinking, reasoning, recognition, and planning. These skills facilitate the understanding of the environment so that it can be manipulated in order to fulfil individual needs and desires (Goswami et al., 2000). Consequently, as humans are perceived as social beings, through their interactions with one another for daily tasks and habitation in groups, these skills may also contribute towards broader social interactions through their influence on individual behaviours.

Cognitive skills contribute towards social interactions as they are used to create mental representations of the social environment. This includes beliefs about the causes of social events, beliefs of individual characteristics, social groups and the general knowledge about social relationships and behaviours. Otherwise known as social cognitive skills, these skills play a salient role in the way in which social events and experiences are attended to, interpreted, stored in memory and retrieved. By acting as filters through which new information and interactions are perceived and understood, they contribute towards existing social representations of past experiences (e.g. expectations, memories) and interact with new information to determine the understanding and interpretation of current events and experiences (Brewer & Hewstone, 2004). The social cognitive perspective thus views the human as an

‘activated actor’ whose behaviours and actions are triggered by environmental cues which in turn activate pre-existing concepts, motivations and behavioural evaluations on a conscious and subconscious level (Fiske & Taylor, 2008). Empirical research investigating the role of cognition in relation to social behaviours, has taken one of two approaches. Firstly, by investigating the role of key cognitive functions, such as IQ which is important for the broader understanding of the environment, theory of mind (ToM) which is important for social interactions, and executive functioning which is important for utilising information for planning and strategising behaviours. Secondly, by investigating proposed theories addressing the underlying mechanisms or processes that are used for making sense of the environment and used in the translation of this information to shape future beliefs and behaviours. The objective of this chapter is to provide an overview of the key cognitive processes and theories involved in children’s social behaviours and to discuss these further in relation to children’s bullying behaviours and the development of adjustment problems.

2.1 Cognitive processes involved in social behaviour

2.1.1 Intelligence Quotient (IQ)

General cognitive ability or intelligence (IQ) is defined as a broader conceptualisation of general mental capability. In contrast to the general population’s traditional perception of IQ as a measure of academic ability, it is a broader capability to comprehend one’s surroundings, and ‘make sense of the world’. It encompasses skills such as reasoning, planning, problem solving, thinking abstractly, and having the ability to learn quickly and from experiences (Gottfredson, 1997). Identified as a multifaceted composite, IQ has three key components (1) Practical problem solving ability, which includes skills such as reasoning logically, obtaining multiple perceptions of a problem, and being open to resolutions. (2) Verbal ability, which includes good conversational skills, and the ability to read well and often; and (3) Social intelligence, which includes being sensitive to social cues, recognising faults, and displaying interest in the social world as a whole (Weinberg, 1989). Early signs of IQ are observable amongst very young children through their ability to learn quickly from experiences and mirror the expressions and behaviours of others, and continue to develop into adulthood. Subsequently, as an underlying mechanism that develops throughout time, different aspects of IQ may have importance for different stages in life. For example, problem solving and reasoning may develop increasing importance as we get older and are faced with more challenging situations. Deficits in IQ and therefore understanding and

making sense of the environment, can be an important marker or contributor towards atypical development.

IQ shows a linearly increasing moderate to high heritability across time. In a study of 11, 000 twin pairs from the United Kingdom, United States, Netherlands and Australia, approximately 41 % of the variance in IQ was explained by genetics in childhood, 55% in adolescence and 66% in early adulthood (Haworth et al., 2010). In parallel, the variance explained by environmental factors decreased from 59% to 33% across time, suggesting that environmental factors may play a more salient role in the development of IQ during individuals' early years (Haworth, et al., 2010). Supporting this notion, past research has highlighted the role of environmental factors as early antecedents of IQ skills. Studies have found that children who grow up in low-income families during infancy or early childhood had greater deficiencies in their general cognitive ability (Feinstein, 2003; Kiernan & Mensah, 2009). Suggestive of a dose response effect, children who experienced persistent poverty for prolonged periods of time had the poorest IQ in comparison to children who experienced less poverty (Najman et al., 2009). It is not only economic disadvantage within the home environment that influences children's IQ skills, but also the level of chaos. Children who grow up in chaotic homes, defined by characteristics such as 'not having a morning routine', 'not being on top of things' and 'not having a calm atmosphere in the home', have poor IQ (Asbury, Wachs, & Plomin, 2005; Deater-Deckard et al., 2009). Other indices of the home environment such as parenting also play a prominent role in the development of IQ amongst children. Cognitive research has found that children who experienced sensitive parenting had higher IQ in comparison to children who did not (Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). Exposure to violence has also been linked with the development of poor IQ amongst children. A twin study of 5 year old children found a dose response effect whereby increased exposure to domestic violence contributed to poorer IQ (Delaney-Black et al., 2002). More specifically exposure to high levels of domestic violence was associated with an average loss of 8 IQ points after controlling for genetic factors and childhood maltreatment. The negative association between violence exposure and IQ extends beyond violence within the home to violence within the community. In one study, children's exposure to community violence such as hearing guns being shot or seeing someone being beaten up, was negatively associated with children's IQ over and above the confounding effects SES and home environment (Delaney-Black, et al., 2002).

As discussed the development of IQ is highly vulnerable to the influence of environmental factors particularly in early childhood. Children may therefore be more prone to developing deficits in their IQ during this time and the influence of these deficits may begin to manifest in their early behaviours. As bullying often occurs in childhood, investigating the impact of poor IQ upon children's involvement in bullying is of interest. Empirical studies investigating poor IQ as an antecedent of bullying behaviours are however limited. Studies within this domain have primarily investigated academic achievement and have observed children who exhibit poor academic performance or school failure are more likely to be the targets of bullying (Schwartz, Gorman, Nakamoto, & Toblin, 2005) and also go on to bully others (Hemphill et al., 2012). One study which focused specifically on IQ, found that children who had low IQ in early childhood were significantly more likely to go on to bully others (Farrington & Baldry, 2010). Although IQ is not only represented by academic ability, academic ability is one component, thus these studies demonstrate the potential risk of having poor IQ on children's involvement in bullying.

In addition to influencing bullying behaviours, deficits in IQ have also been linked with the development of adjustment problems. Empirical evidence from longitudinal studies has shown low IQ in early childhood to be a significant predictor of later conduct disorder, antisocial behaviour and delinquency over and above the effects of other contributory factors such as parental IQ and SES (Farrington, 1990; Fergusson, Horwood, & Ridder, 2005b; Goodman, Simonoff, & Stevenson, 1995; Murray, Irving, Farrington, Colman, & Bloxson, 2010). Childhood deficits in IQ have also been linked with psychiatric disorders in adulthood such as schizophrenia, depression and anxiety (Batty, Mortensen, & Osler, 2005; Gale, Hatch, Batty, & Deary, 2009; Zammit et al., 2004). In one longitudinal study spanning over 20 years, having poor IQ in childhood predicted an increased risk of being diagnosed with schizophrenia spectrum disorder, major depression and anxiety disorder in adulthood (Koenen et al., 2009). Lower childhood IQ was also associated with a greater co-morbidity of disorders. Deficits in IQ may therefore not only influence behaviour within a social context i.e. bullying, but also have a detrimental effect on mental health, thus lending itself well as a potential contributor towards mechanisms underlying the development of adjustment problems amongst children involved in bullying.

2.1.2 Theory of Mind

In line with the contributory role of IQ in shaping social behaviours, another cognitive function of interest is theory of mind (ToM). This refers to the everyday understanding and prediction of other people's behaviours based upon their mental states (e.g., beliefs) and is thus a key component in the development of the social being. Children begin to show early signs of ToM skills as toddlers through their use of pretend play which involves an element of understanding the emotions and behaviours of the 'character' the child is pretending to be (Barr, 2006). Typically by age 4, children develop the core ToM skill of recognising that although it seems like reality, beliefs can be mistaken and thus seen as 'false-beliefs' (Wimmer & Perner, 1983). More advanced skills such as understanding the influence of emotions on other people's beliefs and embedded mental states like 'he thinks she thinks...' are typically developed by age 7 (Perner & Wimmer, 1985). The development of these skills helps regulate and shape healthy social interactions and is considered important for decoding social cues and adjusting behaviours accordingly (Astington, 2001).

Aetiological investigations into individual variance in ToM skills have resulted in mixed findings. In one study, researchers observed individual differences amongst a sample of 3 year old twins to be predominantly influenced by genetic factors (67 % of the variance) and the remaining proportion of variance to be attributed to child specific environmental factors (Hughes & Cutting, 1999). In contrast, findings from the E-Risk study group found amongst 5 year old twins, environmental factors both shared and specific to the twins but not genetic factors explained individual variance in ToM skills (Hughes et al., 2005). The contrast in findings between the two studies could be attributable to a number of reasons. Firstly, in the former study, analyses were performed on a small sample of 250 children. In contrast the E-Risk cohort consisted of 2232 children, thus giving it more statistical power to detect accurate genetic and environmental contributions. Secondly, the difference in age between the two studies might have led to these discrepancies and may be indicative of different factors playing more salient roles in children's development of ToM at different developmental ages.

In line with the empirical evidence that environmental factors have a contributor influence on individual ToM skills, be that in part or completely, the development of ToM is facilitated and hindered by a number of factors. Studies have found that children's language abilities are positively associated with children's ability to

recognise false-beliefs (Cutting & Dunn, 1999; Happé, 1995). Findings from a longitudinal study of 3 year old children spanning over seven months provided directional evidence to illustrate that children's language ability predicts their positive performance of false belief tasks and not the other way around (Astington & Jenkins, 1999). Discourse within the family, in particular expressing emotion (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991) and number of child-aged siblings (McAlister & Peterson, 2006) have also been identified as positively contributing towards children's ability to recognise false-beliefs. Reports of positive associations between the number of siblings and ToM are however mixed, with suggestions that it may be the quality of the interactions with siblings that are important, rather than just their presence (Hughes & Ensor, 2005). In line with this notion of relationship quality, similar associations have also been observed about the quality of parent-child relationships. For example, there is some evidence to suggest that the quality of attachment, which is typically linked to mother-child relationship, influences children's ToM skills, whereby children who have formed 'secure' attachment during early childhood display greater ToM skills (Fonagy, Redfern, & Charman, 1997; Meins, Fernyhough, Russell, & Clark-Carter, 1998). Children who have been subjected to harsh parental discipline such as physical punishment (Ruffman, Perner, & Parkin, 1999) have poorer ToM over and above the influence of age, general cognitive ability and maternal education (Pears & Moses, 2003). These findings have been further extended to children who have been maltreated (Cicchetti, Rogosch, Maughan, Toth, & Bruce, 2003; Pears & Fisher, 2005). Other indices of the home environment, such as low socioeconomic status have also been negatively associated with the development of ToM skills (Cutting & Dunn, 1999), thus indicating the importance of early environmental factors on children's development of ToM.

As ToM skills are important for healthy social interactions, deficits in understanding others' mental states are associated with difficult behaviours. Children with poor ToM have reported higher levels of adjustment problems such as behavioural problems (Hughes & Ensor, 2006). Moreover, as children enter their schooling years, the group with whom they interact the most with are children/peers. It is thus surprising that traditionally, studies investigating ToM in relation to bullying involvement, as a form of peer interaction, have been limited. This is however now changing. Studies have shown that victims of bullying have poor ToM (Gini, 2006; Sutton, Smith, & Swettenham, 1999). Findings however are mixed for bullies with some studies reporting advanced

ToM skills for bullies who play a leadership role (Renouf et al., 2010; Sutton, et al., 1999) and others showing deficits (Monks, Smith, & Swettenham, 2005). An explanation for the contrasting findings for bullies may be down to the type of behaviour being exhibited. Advanced ToM skills such as being able to track others' beliefs and pre-empt behaviours based on the emotions generated as a result of these beliefs, may be more salient for indirect types of bullying such as social exclusion and the manipulation of peers within a group. In contrast, advanced ToM skills may be less important for direct forms such as hitting and pushing, where the ability to understand or follow others' thoughts does not contribute towards the execution of the bullying behaviour. Similarly, the role of ToM may also be dependent on age. As older children engage in higher levels of indirect bullying behaviours (Craig, et al., 2009), ToM skills may play a more prominent role in older bullies in comparison to those of a younger age who are less likely to engage in indirect bullying behaviours such as manipulation of social groups. Moreover, these studies are predominantly cross-sectional or span only a short period of time, thus limiting the extent to which they can inform about the influence of ToM on involvement in bullying over time. This emphasises the need for further attention in the investigation of ToM skills and children's involvement in bullying. Findings from this line of enquiry may also be important in understanding the aetiology of bullying as a form of social interaction.

2.1.3 Executive functioning

Social behaviours are also governed by executive functioning skills, which include a set of cognitive processes such as planning, which are necessary for goal orientated and purposeful actions. In addition, by underlying self-regulation of thought, action, and emotion, these skills come in to play when an individual faces novel or challenging situations (i.e. peer conflict) for which pre-existing or automated responses are not present. The individual is thus required to formulate an appropriate response with the aid of skills such as working memory, planning, problem solving and self-control (Welsh, Friedman, & Spieker, 2006). Executive functioning skills develops from infancy through to adulthood (Hughes & Ensor, 2005; Séguin & Zelazo, 2005; Weyandt, 2005), however by age 7 children typically develop early executive functioning skill such as inhibitory control (Jones, Rothbart, & Posner, 2003), planning (Hudson, Shapiro, & Sosa, 1995), and working memory (Espy, Kaufmann, McDiarmid, & Glisky, 1999).

Research into children's executive functioning capabilities has followed the line of thought that executive functioning can be viewed as either a diverse concept made up of many modules that should be considered individually (i.e. working memory, inhibitory control), or a single unitary ability (Duncan, Johnson, Swales, & Freer, 1997; Miyake et al., 2000). Possibly, as a result of this bilateral conception of executive functioning, aetiological investigations have reported considerable variation in genetic and environmental contributions towards individual differences in executive functioning. High heritability estimates ranging from 77 % to 99% have been reported for a single unitary module of executive functioning (Coolidge & Thede, 2000; Friedman et al., 2008) in comparison to estimates ranging from 43% to 56% for individual components of executive functioning such as working memory (Ando, Ono, & Wright, 2001; Polderman et al., 2006). These findings suggest that environmental factors may have a more influential role in the development of more specific executive functioning skills. Consistent with the literature investigating environmental factors contributing to other cognitive abilities such as IQ and ToM, key factors such as socioeconomic disadvantage and parent-child relationship have also been found to contribute towards children's executive functioning skills as a whole (Hughes & Ensor, 2005), and more specifically to certain individual components. There is some evidence to suggest that low SES negatively contributes towards children's working memory and executive control skills (Noble, McCandliss, & Farah, 2007). Furthermore, children's experiences of high levels of negative parenting has been linked with poorer inhibitory control (Moilanen, Shaw, Dishion, Gardner, & Wilson, 2010) and more supportive parenting has been linked with higher levels of working memory (Bernier, Carlson, & Whipple, 2010).

Executive functioning is important for attaining desired goals, thus difficulties in implementing such skills can also be detrimental to social behaviour. Children with poor executive functioning may engage in behaviours which are impulsive, erratic, and exhibit poor self-control, consequently increasing their vulnerability for engaging in aggressive behaviours (Lezak, 1995). For example in a playground situation where one child takes the ball off another, an erratic child or one with poor self-control may lash out and hit the child who has taken the ball rather than to go and seek help from a teacher. Evidently children with poor executive functioning have been shown to display less control over their disruptive behaviours (Cole, Usher, & Cargo, 1993) and more likely to be referred for professional help (Speltz, DeKlyen, Calderon, Greenberg, & Fisher, 1999). The association between poor executive functioning and aggressive

behaviours has been observed across different ages. In a study of pre-schoolers, 'hard to manage' children (who were selected on the basis of parental ratings of hyperactivity and inattention) performed significantly worse on tasks that assessed inhibitory control and planning when compared to their peers (Hughes, Dunn, & White, 1998). However, the associations weakened when verbal ability and social background (i.e. mother's education) were taken into account, thus suggesting that it is difficult to view children's executive functioning in isolation of other environmental factors. Similarly, aggressive behaviours (i.e. physical aggression) have also been reported amongst adolescents (Séguin, Boulerice, Harden, Tremblay, & Pihl, 1999; Séguin, Pihl, Harden, Tremblay, & Boulerice, 1995). Moreover the risk posed by poor executive functioning is not specific to aggressive behaviours in early life but also extends into adulthood. In a prospective longitudinal cohort, poor executive functioning in adulthood was identified as a significant marker of frequent physical aggression (Barker et al., 2007).

Executive functioning skills may also have an effect upon children's involvement in bullying, as another form of aggressive behaviour. In particular poor executive functioning may be applicable to direct forms of bullying such as hitting and pushing where there is little need to plan or organise behaviours. Deficits in executive functioning skills may thus be more salient for younger children's roles in bullying rather than those who are older. Unfortunately, empirical support for the role of executive functioning amongst bullies is limited. In a study of 'hard to manage' pre-schoolers, children who showed deficits in executive functioning through poor executive planning and inhibitory control engaged in more bullying and teasing behaviours (Hughes, White, Sharpen, & Dunn, 2000). In another study of 11-14 year old children, researchers found bullies to have poor executive functioning such as problems in decision-making, planning, and organisation (Coolidge, DenBoer, & Segal, 2004). However, this latter study had a number of limitations. Firstly, data was reported from a small number of children and secondly, children identified as 'bullies' included those who were referred to school counsellors for behaviours such as name calling, fighting, relentless picking on other students, and defiance toward teachers, thus resulting in this group not being specifically bullies but rather children with general disruptive behaviours. As a result, it is difficult to ascertain the role of executive functioning specifically in relation to bullying, thus highlighting the need for further investigation. The first and third empirical chapters of this thesis intend to extend

current knowledge regarding the role key cognitive components may have as precursors of children's involvement in bullying.

2.2 Cognitive theories of social behaviour

2.2.1 Social information processing model

A widely established theory for understanding social behaviour is the social information processing model which was proposed to understand children's aggressive behaviours (Crick & Dodge, 1994; Dodge, 1986). The social information processing model explains behaviour as a function of a sequence of processes. When faced with a social situation such as an encounter with a fellow peer, an individual first decodes the environmental information using a series of internal and external cues, which are then interpreted and used to select a response. The behavioural response is then either constructed, or accessed if it pre-exists as a result of a prior encounter of a similar nature. The behavioural response is then selected and enacted (Crick & Dodge, 1994). Each of the stages in the sequential process of extracting information to inform one's behaviour is affected by a number of factors such as individual temperament, personality, social norms and knowledge, stored memories and pre-existing schemas. Based on this model, children either engage in or are the recipients of peer aggression as a result of the manner in which they are processing the social information that they are faced with. More specifically, distortions in decoding social cues may result in children who are susceptible to perceiving threatening cues to only take notice of perceived threats and exclude any other information that would suggest otherwise. Studies have found that children with aggressive behaviour problems in school and outside are more likely to attend to hostile cues (Dodge, Pettit, Bates, & Valente, 1995) and fail to take notice of non-hostile cues (Dodge, Price, Bachorowski, & Newman, 1990). Distorted social information processing may also contribute towards the formation of hostile attributional biases, which are characterised by the tendency to attribute hostile intent to others' behaviour in ambiguous situations. Evidence indicates that youth who make hostile attributions for others' behaviour have elevated rates of aggressiveness (Dodge, 1980; Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002).

Maladaptive information processing may also contribute towards children's risk of being victimised. Children may incorrectly interpret peers' behaviours and expect to be victimised, thus resulting in being victimised as a result of their expectant behaviour. Although literature investigating the relationship between social information

processing, hostile attribution biases and aggression is ample, studies specifically investigating bullying are limited. Those which have, have found both bullies and victims of bullying to display deficits in social information processing (Camodeca & Goossens, 2005; Pornari & Wood, 2010).

2.2.2 Attribution theory

Maladaptive information processing is not only important as an underlying mechanism which acts as an antecedent of bullying but also as a translational step towards the development of adjustment problems. In accordance with the attribution theory, a key component of decoding information from the environment is to assign intent or causation to the occurrence of events and others' behaviours. By attributing a cause or intent, individuals are able to have some control, predict and understand their environment (Weiner, 1985). This is not only important for informing an individual's responsive or general behaviours but also acts as a reinforcement tool for shaping their self-concept and understanding the implications the event or behaviour may have on one's life. The most widely accredited framework for the attribution theory proposes that the causation of events and behaviours can be placed upon three key continua (1) internal-external, which explains an event as being caused by the self versus factors outside the self; (2) global-specific, which explains an event as being caused by factors that will affect all situations versus factors that are situation-specific; and (3) stable-unstable, which explains an event as being caused by factors that are consistent and stable across time versus unstable, unpredictable and inconsistent factors (Abramson, Seligman, & Teasdale, 1978).

Researchers have suggested that these cognitive styles develop and stabilise throughout childhood, thus experiences and life events during this time play a crucial role in the formation of such styles (Crick & Dodge, 1994). Studies have suggested a number of factors that may contribute to the development of negative attributional styles in children (Haines, Metalsky, Cardamone, & Joiner, 1999). These factors include family experiences and parental relationships (Peterson & Seligman, 1984). For example, children may learn their attributional styles from observations of their parents and families. This has been empirically supported by a number of studies, which have shown cross-sectional associations between parents' attributional feedback and children's attributional styles (Alloy et al., 2001; Garber & Flynn, 2001). Children's adjustment problems such as depression may also contribute towards the formation of

attribution styles (Bennett & Bates, 1995; Johnson & Miller, 1990). Feelings of low self-worth and depressive symptoms may result in self-blame for negative events thus contributing to the development of negative attributional styles. Moreover, given that the relationship between the individual and the environment is reciprocal, repetitive exposure to negative life events may also contribute towards the formation of negative attributional styles. When faced with a negative event, people attempt to understand the causes, consequences, and meanings of the events so that future negative events may be avoided. However when the negative event reoccurs, initial positive attributions associated with its occurrence may become disconfirmed and replaced with more negative ones (Rose & Abramson, 1992). For example, a child may initially explain a bad test result by saying, 'that test was unfair,' however after receiving bad marks repeatedly the child may begin to think 'I'm stupid'. The contributory influence of negative life events on attributional styles has been supported by two longitudinal studies, which found that elevated levels of negative life events contributed to the development of negative attributional styles (Garber & Flynn, 2001; Nolen-Hoeksema, Girgus, & Seligman, 1992).

As attributional styles are important for making sense of the environment, their atypical development or biases may contribute towards the development of adjustment problems. Individuals who blame themselves (internal) for the occurrence of negative events (e.g., 'I was not picked to join the football team because I am a terrible football player') and consider this to be general across all situations (global) and consistent across time (stable) (e.g., 'I am not good at any sports and I never will be') are at a risk of feeling helpless and developing depressive symptoms (Abramson, Seligman & Teasdale 1978). Empirical support for the association between biased attributional styles, in particular negative attributional styles (internal, global and stable) and depression is well established. Primarily this has come from cross-sectional studies, which have all reported increased levels of depressive symptoms amongst children and adolescents with negative attribution styles (Gladstone & Kaslow, 1995; Jacobs, Reinecke, Gollan, & Kane, 2008). There is also some evidence from longitudinal studies that suggest that negative attributional styles contribute towards the development of depression. In a study of middle-school aged children spanning across five years, children's negative attribution styles significantly predicted later levels of depressive symptoms. Interestingly, negative attribution styles only became a significant predictor of children's depressive symptoms when children grew older

(Nolen-Hoeksema, et al., 1992). These findings thus suggest that negative attribution styles which have had the opportunity to develop and embed themselves within an individual's cognition may play a more salient role in the development of depressive symptoms amongst children and adolescents. Similar associations have been observed in a study of adolescents who were assessed over a six year period (Garber, Keiley, & Martin, 2002). Adolescents' negative attributions significantly predicted their depressive symptoms over and above the contributory effect of gender and maternal history of depression. Importantly, findings from this study showed that children who reported a negative attributional style at baseline continued on a linear trajectory towards a more negative attributional style at the end of the six year follow up. Early negative attribution styles are thus not only an important marker for depressive symptoms but may also help to understand the continuity of depression. The continuation on a trajectory for negative attributional styles may fuel already existing depressive symptoms and contribute towards their chronicity. Unfortunately, both studies did not control for child/adolescent baseline levels of depression, thus making it difficult to ascertain whether predictive association between negative attribution styles and later depressive symptoms was not in part explained by pre-existing depression.

Although there is substantial evidence that negative attributional styles are associated with depression, less is known about whether they are also associated with behavioural problems such as aggressiveness and delinquency. Research to date investigating the relationship between attributional styles and behavioural problems has focused on hostile attribution styles which are characterised by the tendency to attribute hostile intent to others' behaviour in ambiguous situations (Dodge, 1980; Orobio de Castro, et al., 2002). Evidence indicates that youth who make hostile attributions for others' behaviour have elevated rates of behaviour problems, in particular aggressiveness. There is, however, a smaller literature showing that negative attributional styles are a risk factor for behaviour problems as well. Specifically, attributing negative life events to internal and global causes can result in feelings of frustration that are expressed through aggression (Toth, Cicchetti, & Kim, 2002). Empirical support for this hypothesis has been provided by studies that have found similar associations between negative attributional styles (internal, global and stable) and behavioural problems such as delinquency and aggression (Hankin & Abramson, 2002; Rowe, Maughan, & Eley, 2006; Weiss, Susser, & Catron, 1998).

As discussed, evidence suggests that a number of environmental factors as well as negative life experiences can influence the formation of attribution styles. As a tool to interpret environments, attribution styles, in turn can contribute towards the development of adjustment problems. For example, children and adolescents who employ attributional styles which result in feelings of negativity are especially prone to mental health problems (Jacobs et al., 2008). As an early negative life stressor, youth experience of bullying may contribute towards the formation of biased attribution styles and as bullied children have elevated levels of mental health problems (Arseneault et al., 2010), these styles may act as a mechanistic pathway involved in the development of adjustment problems amongst youth involved in bullying. The limited empirical evidence showing associations between bullying victimisation and negative attributional styles, has found that children and young adults who had been bullied both verbally and physically in childhood reported more negative attributional styles in comparison to those who had not been bullied (Gibb, Abramson, & Alloy, 2004; Mezulis, Hyde, & Abramson, 2006). The second empirical chapter of this thesis intends to add to the limited number of studies investigating the attributional theory with relation to children's bullying involvement and associated adjustment problems.

2.3 Aims and structure of thesis

This thesis intends to advance current knowledge regarding the aetiology of bullying. It aims to investigate cognitive developmental pathways underlying youths' vulnerability for being involved in bullying and developing associated adjustment problems.

Consequently the objectives of this thesis are threefold: (1) investigate whether early cognitive functioning acts as a developmental marker for children's later involvement in bullying; (2) investigate the role of bullying victimisation on children's cognitive processing of their environments and whether these techniques are associated with children's adjustment problems; (3) investigate whether early cognitive functioning acts as a specific marker for bullies compared to non-bullies who have other antisocial behaviour problems.

The first empirical chapter (chapter 4) investigates whether children involved in adolescent bullying had poor theory of mind (ToM) in early childhood. This study utilises longitudinal data spanning across a developmentally sensitive period of time for children's ToM and involvement in bullying. Using multivariate regression modelling to account for child specific and family factors this study investigates the predictive

association between children's early ToM and their later involvement in bullying. It further investigates the role of emotional and behavioural problems during middle childhood as an underlying mechanism that may help to explain the translational influence of ToM upon children's later involvement in bullying. Findings from this study have been published in the *Journal of Child Psychology and Psychiatry* (Shakoor et al 2012).

The second empirical chapter (chapter 5) investigates whether bullied children differ from non-bullied children in their use of cognitive attributional styles and whether these styles are associated with children's adjustment problems. Using the discordant monozygotic twin study design to investigate attributional styles amongst bullied children, this study controls for a wide range of confounders including genetic and familial factors (i.e. SES, parental education).

The third empirical chapter (chapter 6) investigates children's early cognitive functioning, temperament and family factors as indices of similarities and/or differences amongst children who bully others and those who have other antisocial behaviour problems. Using longitudinal data from two epidemiological cohorts from different continents and decades, this study replicates its comparison of bullies and children with high and moderate level of antisocial behaviours on a series of early antecedents. It further investigates the negative outcomes of bullies and children with high and moderate levels of antisocial behaviours in adolescence and adulthood.

Lastly, this thesis will conclude (chapter 7) by discussing the findings from all three empirical studies in relation to their contribution towards the understanding of bullying behaviours and their implications for future research and interventions.

3 Methodology

The objective of this chapter is to outline the sample and main measures which have been used across all studies.

3.1 Sample description

This thesis draws upon data collected from the Environmental Risk longitudinal Study, the TEDS Peers (Promoting Enjoyable and Engaging Relationships at School) Study and the Dunedin Multidisciplinary Health and Development Study.

3.1.1 Environmental Risk Longitudinal Twin Study

Participants were members of the Environmental Risk (E-Risk) Longitudinal Twin Study, which investigates how genetic and environmental factors shape the development of a nationally representative birth cohort of 2,232 British children. The sample was drawn from a larger birth register of twins born in England and Wales in 1994–1995 (Trouton, Spinath, & Plomin, 2002). Of the 15,906 twin pairs born in 1994–1995, 71% joined the TEDS register.

The E-Risk sample was constructed in 1999–2000, when 1,116 families with same-sex 5-year-old twins (93% of those eligible) participated in home-visit assessments. Same sex dizygotic twins were selected to allow for a better comparison to monozygotic twin pairs who are necessarily of the same sex, thus avoiding confounding twin similarity with brother-sister dissimilarity. Families were recruited to represent the UK population of families with new-borns in the 1990's, based on (a) residential location throughout England and Wales and (b) mother's age (i.e., older mothers having twins via assisted reproduction were under-selected and teen-aged mothers with twins were over selected). This sampling was used to (a) replace high-risk families who were selectively lost to the register via non-response and (b) ensure sufficient numbers of children growing up in high-risk environments. Age at first childbearing was used as the risk-stratification variable because data were present for virtually all families in the register, it is relatively free of measurement error, and early childbearing is a known risk factor for children's problem behaviours (Maynard, 1997; Moffitt & Team, 2002). The study sought a sample of 1,100 families to allow for attrition in future years of the longitudinal study while retaining statistical power. An initial list of families who had same-sex twins was

drawn from the register to target for home visits, with a 10% over-sample to allow for non-participation. Of the 1,203 families from the initial list who were eligible for inclusion, 1,116 (93%) participated in home-visit assessments when the twins were 5 years of age, forming the base sample of the study: 4% of families refused, and 3% were lost to tracing or could not be reached after many attempts. Research interviewers visited each home for 2.5 to 3 hours, in teams of two. While one research interviewer interviewed the mother, the other tested the twins in sequence in a different part of the house. Families were given Marks & Spencer or Kingfisher vouchers for their participation, and children were given colouring books and stickers. All 16 research interviewers had university degrees in behavioural science, and experience in psychology, anthropology or nursing. Each research interviewer completed a formal 15-day training programme on either the mother interview protocol or the child assessment protocol, to attain certification to a rigorous reliability standard. Home visits helped to insure complete non-missing data that was uncompromised by a parent's reading skills, from families that represent the full population range of risk circumstances. With parent's permission, questionnaires were posted to children's teachers, and teachers returned questionnaires for 94% of cohort children. Zygosity was determined using a standard zygosity questionnaire, which has been shown to have 95% accuracy (Price et al., 2000). Ambiguous cases were zygosity-typed using DNA. The sample includes 54% monozygotic (MZ) and 46% dizygotic (DZ) twin pairs. Sex is evenly distributed within zygosity (49% male).

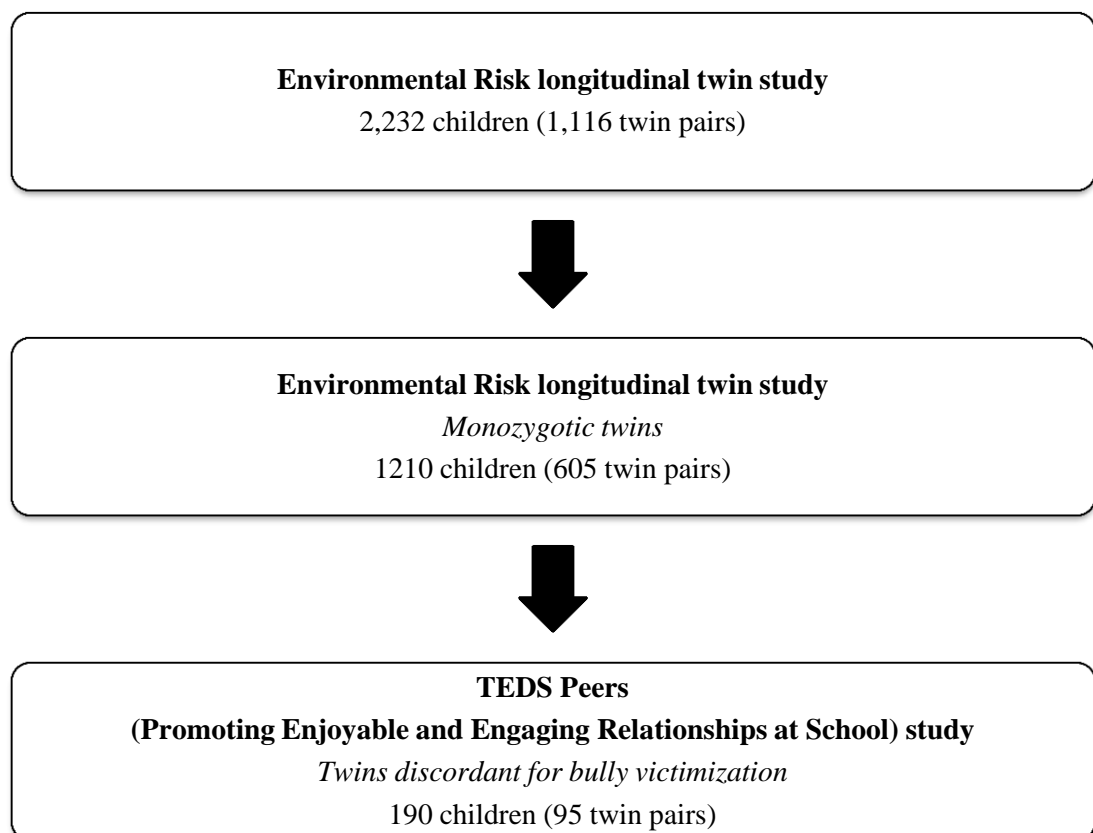
Follow-up home visits were conducted when children were 7 years (98% of the E-Risk Study families, N= 2,191), 10 years (96%, N= 2,143) and 12 years (96%, N = 2,143). Follow-up visits followed the same procedures, and research interviewers were trained in the same way. With the parent's permission, questionnaires were mailed to the children's teachers when children were 7 years (93% response rate), 10 years (90%) and 12 years (85%). High participation rates were achieved using several measures. Study families provided details of four persons (e.g. grandparents, aunts) who would be able to provide contact information, and also gave consent to contact their GP. Study members were sent a newsletter twice per year and each twin received a birthday card each year. If newsletters or cards were returned undelivered, tracing procedures were immediately initiated. Home visits also helped to achieve high participation rates. In contrast, only 40% of E-Risk families returned repeated postal questionnaires sent by TEDS. Thus if not visited, families with high environmental risk may have been lost.

Parents gave informed consent at each wave of assessment, and children gave assent for the age 12 interviews. Ethical approval was granted by the Joint South London and Maudsley and the Institute of Psychiatry NHS Ethics Committee for each phase of the study.

3.1.2 TEDS Peers (Promoting Enjoyable and Engaging Relationships at School) study sample description

Participants were members of the TEDS Peers (Promoting Enjoyable and Engaging Relationships at School) Twin study, a sample of 95 monozygotic 12 year old twin pairs, who have been selected from the E-Risk study (as describe above) for being discordant in their experiences of bully victimisation (Figure 1). The monozygotic discordant twin sample was created in order to control for genetic effects and further investigate environmental factors. The sample includes a total of 190 children of whom 96 (51%) were male and 94 (49%) were female. 95 children (50%) had experienced bullying victimisation and 95 children had not.

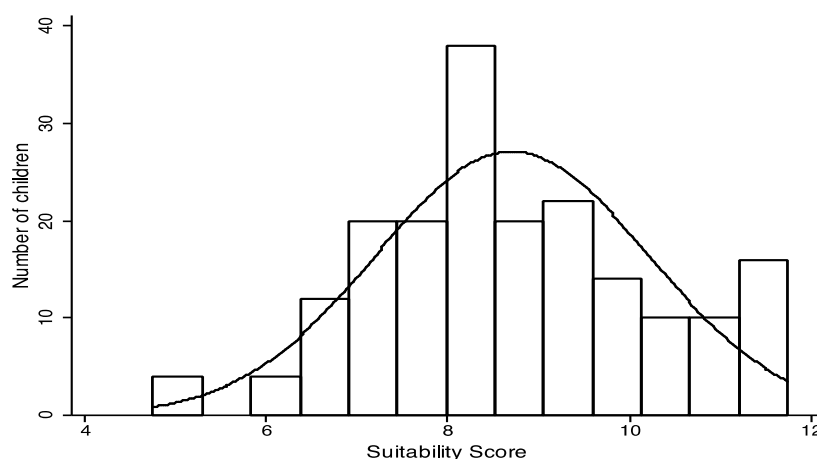
Figure 1: TEDS Peers sample description



Participating families were selected based on; (1) mothers' and children's reports of bullying experiences at age 12. As a part of the E-Risk study, participants were visited

at home by trained research interviewers. During these visits when children were aged 7, 10 and 12 mothers were asked about children's bullying experiences. At age 12 children were also asked about their bullying experiences. (2) A suitability criterion, which consisted of four domains; (1) severity of bullying, which included the type of bullying i.e. physical or psychological, the duration and whether intervention was required. (2) Discordance in bullying experiences with one another, which was assessed using both mother and child report at age 12. Both mother and child were scored individually on the reported level of discordance, from which an average score was calculated. (3) Past experience of bullying, which was determined by looking at the mother's report of bullying at phase 10 and phase 7 for the child who was seen as being the 'non- victim'; (4) Agreement between the informants, which was assessed based on the bullying notes and answers provided by both mother and child. Each participant was given a score of '1' (low), '2' (medium) and '3' (high) in each of the four domains. A sum score across the four domains was then calculated to establish a final suitability score for the participants (Figure 2). To control for inter-rater biases, four trained research interviewers with university degrees in behavioural science and experience in psychology scored each family on their suitability. Inter-rater correlation ranged between 0.6 for severity and agreement, 1.0 for discordance and 0.8 for past experiences. An average score was calculated using the four individual scores. The higher the suitability score, the more discordant the twin pairs were on their experience of bully victimisation. A score ranging between 9 and 12 was considered as being high, a score between 6 and 8 as being medium, and a score between 4 and 5 was considered as being low. 2 % of the sample group was scored as low, 52 % was scored as medium and 46 % was scored as high, using this suitability criterion.

Figure 2: Distribution of suitability score



Based upon the selection criteria a total of 109 families were selected to be contacted for partaking in the study. 95 (87%) families participated and 14 (13%) did not. Although meeting the criteria, three of these families were not contacted due to the questionability of their ability to complete the test battery and the reliability of the information reported about their bullying experiences. A further 11 families refused to take part, of whom five reported being too busy and not interested. The remaining six were considered as passive refusals due to their inability to confirm an appointment date. In addition, these families were difficult to maintain contact with after initial contact and failed to attend arranged appointments.

Families were invited to a research centre in London within a 6 month period after being originally visited at their homes by members of the E-Risk research team. A 6 month period was given to ensure that the participants did not feel overwhelmed by the experience of partaking in the research project. For families who were unable to come to the centre in London, arrangements were made to visit them at their local youth centre, library or university. Families were not visited in their homes, as the aim was to maintain a neutral testing environment. In addition, due to the time scale of the assessment and amount of equipment needed, it was not deemed appropriate to ask families for home visits.

Prior to participating in the study, parents gave informed consent and children gave assent. Participants spent 3 to 3.5 hours with researcher interviewers on a one to one basis, and were asked to complete a series of questionnaires and computer tasks designed to assess cognitive and emotional processes. In addition they were asked to provide cortisol samples on 8 occasions and measurements of blood pressure and heart rate on 10 occasions during this time period. Whilst the participants completed the tasks assigned to them, parents were asked to complete a number of questionnaires separately. These took no longer than 45 minutes and consisted of questions investigating cognitive and emotional responses to certain situations. Parents were asked to complete a self-report and a report on their son or daughter. To thank families for their time, mothers were given Love2Shop vouchers in the value of £25 and the twins were given £10 vouchers each. For all families, travel arrangements were taken care of and paid for by the research team prior to their visits. Families who required an over night stay were provided with paid hotel rooms which included breakfast. In

addition to this, families were given £50 to pay for a meal. For these families mothers were not given £25 Love2Shop vouchers.

All six research interviewers involved in the data collection of the study had university degrees in behavioural science, experience in psychology and had undergone criminal records bureau (CRB) checks. Each research interviewer completed a formal 14-day training programme on how to administer the test battery to ensure reliability and a high standard in the data collected. Ethical approval was granted from the Maudsley Hospital Ethics Committee.

3.1.3 Dunedin Multidisciplinary Health and Development Study sample description

Participants were members of the Dunedin Multidisciplinary Health and Development Study, a longitudinal investigation of the health and behaviour of a birth cohort of children born between 1972 and 1973 in Dunedin, New Zealand (Moffitt, Rutter, & Silva, 2001). A total of 1,037 children (52% male) from the cohort (91% of those eligible) participated in the assessment. Perinatal data were collected at birth, followed by participants first taking part in the assessment at age 3 years. Follow-up evaluations were conducted at ages 5, 7, 9, 11, 13, 15, 18, 21, 26, 32 and, most recently, 38 years. Participation rates ranged from 82% to 97% (Figure 3).

Figure 3: Percentage of Dunedin Study members assessed at each age



Participants represented the full range of socioeconomic status levels in the general population of New Zealand's South Island and were primarily Caucasian with European ancestry (88%). Although all participants of the Dunedin study were born in Dunedin, only 37% of the sample lived in Dunedin at the 32-year-old follow-up evaluation. 39% lived elsewhere in New Zealand, 15% lived in Australia, 6% lived in the United Kingdom, and the remaining 3% lived elsewhere in the world.

Participants attended the research unit for a full day of individual data collection, which included measures of physical and mental health. In addition to collecting data from members of the Dunedin cohort, maternal, paternal and teacher reports were also collected up until the assessment at age 15. When participants were age 18 they were also asked to nominate three people who knew them well and could be contacted as further informants. These mostly included best friends, partners, spouses and other family members. At each assessment phase, informed consent was obtained for all participants from either the accompanying parent (assessment ages 3–15) or the participants themselves (assessment ages 18–38). The Otago Ethics Committee approved the Dunedin study protocols at each phase.

This thesis reports findings on participants who partook in the 32-year-old follow-up evaluation. This represents 972 (96%) of the 1,015 cohort members who were alive at age 32 between 2004 and 2005.

3.2 Measures

3.2.1 Bullying victimisation

Environmental Risk Longitudinal Twin Study and TEDS Peers

Mother's report

We assessed experiences of bullying victimisation using mothers' reports during home interviews when children were aged 7, 10 and 12. A definition of bullying was provided which explained that, 'Someone is being bullied when another child (1) says mean and hurtful things, makes fun or calls a person mean and hurtful names; (2) completely ignores or excludes someone from their group of friends or leaves them out on purpose; (3) hits, kicks, or shoves a person, or locks them in a room; (4) tells lies or spreads rumours about them; and (5) other hurtful things like these. We call it bullying when these things happen often, and when it is difficult to make it stop. We do not call it bullying when it is done in a friendly or playful way'. Mothers were asked whether

either twin had been bullied by another child, responding ‘never’, ‘yes’, or ‘frequently’. When children were aged 7 and 10, mothers were asked whether either twin had been bullied by another child since the age of 5 years. When mothers responded ‘yes’ or ‘frequently’, they were asked to describe what happened. Research interviewers made note of their detailed narrative. Experiences of bullying victimisation within the E-Risk study included children being excluded from groups and games or being called names, because they/she/he did not have a father. Other cases involved children being smacked across the face everyday for a month, children being stabbed with a pencil, and children being beaten up. In addition to be asked whether their child had been bullied by another child, mothers were also asked whether their children had suffered from physical harm or psychological distress as a consequence of being bullied. Mothers reported their children having suffered physical harm (e.g. bruise, cut, and burn) and psychological harm (e.g. bad dreams, tummy ache, and school avoidance). The test-retest reliability of bullying victimisation was 0.87 using a sample of 30 parents who were interviewed twice, 3-6 weeks apart.

Child’s report

We assessed experiences of bullying victimisation using children’s reports during private home interviews when children were aged 12. Children were not asked to report on their bullying experiences during age 7 and 10 interviews due to the ethical consideration raised by asking young children to recall traumatic and emotionally sensitive experiences. During age 12 interviews children were provided with the same definition of bullying that was shown to mothers and asked whether they had been bullied by another child by responding ‘never’, ‘yes’, or ‘frequently’. Children were further questioned whether they had experienced bullying victimisation (1) before they started school, (2) whilst they were at primary school or (3) after they started secondary school. When children responded ‘yes’ or ‘frequently’, they were further probed by research interviewers to describe what happened.

Validity and reliability of bullying measure

We examined the reliability and validity of mothers’ and children’s reports of bullying victimisation to ascertain whether reports from both informants can be used in conjunction as a measure of children’s bullying victimisation. Investigation into the construct validity of mothers’ and children’s reports of bullying victimisation demonstrated that both informants reported information which adhered to the definition

of bullying victimisation. When mothers reported that their child had been bullied during secondary school, 96% recalled that the bullying was perpetrated by peers, 75% recounted it was repeated over time, and 84% reported evidence of a power imbalance between the bully and the victim. A total of 86% of mothers' reports showed evidence for at least 2 of the criteria for bullying victimisation. In comparison, when children reported having been bullied during secondary school, 99% recounted the behaviours to have been perpetrated by peers, 61% recalled bullying to have been experienced repeatedly over time, and 81% reported evidence of a power imbalance. A total of 85% of children reported at least 2 of the criteria for bullying victimisation. The inter-rater reliability between mothers' and children's reports was modest with kappa coefficient values of 0.200 for bullying victimisation during primary school and 0.292 during secondary school (Table 1).

Table 1: Agreement between mothers' and children's reports of bullying victimisation

	Informant	N (%) children	Agreed by other informant %	Kappa coefficient (k)
Bullied in:				
Primary school	Mothers	956 (43%)	52%	0.200**
	Children	871 (41%)	56%	
Secondary school	Mothers	772 (36%)	45%	0.292**
	Children	578 (27%)	60%	

Note: ** = $p < 0.01$

Although the agreement between mothers' and children's reports was modest, we did observe predictive validity of mothers' and children's reports of bullying victimisation with children's emotional and behavioural problems (Table 2). Mothers' reports yielded slightly larger effect sizes compared to those calculated using children's reports when bullying victimisation occurred during primary school (Cohen's d : 0.392 vs. 0.172 for emotional problems; 0.265 vs. 0.148 for behavioural problems). When bullying victimisation occurred during secondary school, effect sizes increased for both informants and mothers' reports still yielded slightly larger effect sizes compared to those calculated using children's reports (Cohen's d : 0.572 vs. 0.420 for emotional problems; 0.411 vs. 0.382 for behavioural problems) (Shakoor et al., 2011).

Table 2: Standardised scores of mothers' and teachers' combined rating of children's emotional and behavioural problems at age 12 for bullied and non-bullied children

		Non-bullied	Bullied		
Age 12 problems	Informant	Mean (SD)	Mean (SD)	β (95%CI)	Effect size (d)
Bullied in Primary school					
Emotional	Mothers	-0.173 (0.871)	0.218 (1.109)	0.390 (0.296, 0.484)	0.392
	Children	-0.072 (0.932)	0.102 (1.085)	0.174 (0.078, 0.269)	0.172
Behavioural	Mothers	-0.117 (0.902)	0.150 (1.100)	0.233 (0.137, 0.330)	0.265
	Children	-0.062 (0.950)	0.088 (1.069)	0.146 (0.048, 0.243)	0.148
Bullied in Secondary school					
Emotional	Mothers	-0.208 (0.840)	0.366 (1.143)	0.574 (0.472, 0.676)	0.572
	Children	-0.113 (0.910)	0.303 (1.159)	0.415 (0.303, 0.527)	0.420
Behavioural	Mothers	-0.149 (0.876)	0.261 (1.142)	0.394 (0.288, 0.500)	0.411
	Children	-0.103 (0.925)	0.274 (1.145)	0.337 (0.224, 0.451)	0.382

Note: SD= standard deviation. β = standardised beta coefficient, CI= confidence intervals. All analyses were controlled for children's gender. No interaction effect was observed between victimisation and children's gender

Although both mothers' and children's reports of bullying victimisation were valid and reliable (Shakoor et al., 2011), the low levels of agreement across different informants (Ronning et al., 2009; Wienke Totura et al., 2009) suggests that bullying victimisation may be specific to different certain environments or settings. Therefore, collecting data from multiple informants may help to capture all instances of bullying victimisation.

To capitalise on the multiple informant reports of bullying victimisation and to ensure all instances of bullying victimisation are captured the empirical studies discussed in chapters 4 and 6 have used combined reports of mothers and children. Information from multiple informants may be utilised by using simple combining methods such as summing the data, calculating mean scores or using an 'either or' approach. Such techniques will therefore allow for the use of data from all informants, and for cases where data may be missing from one informant and not another. Although such techniques capture information from the maximum number of cases available and therefore potentially increase the power to detect smaller associations, one disadvantage is that the data from multiple sources may result in an increase in measurement error. Other more complex methods for combining data from multiple informants include

latent variable modelling whereby information collected from numerous sources is used collectively to create an index of a latent construct (Holmbeck, Li, Schurman, Friedman, & Coakley, 2002). An advantage of this method is that it retains shared variances between informants and considers these to be free from measurement error. Any variance that is not shared between informants is thus considered as error variance, which can be problematic, as by discarding non-shared variance this method does not capitalise on any unique information that is provided by each individual informant. For example children as informants may provide information that captures incidents that also include the school environment, in comparison to parents who may only be able to provide details about the home and neighbourhood. Therefore when using data from multiple informants, researchers should take these factors into consideration in relation to their hypothesis. Investigations into the environments in which bullying takes place may not benefit from combining data from multiple informants, however studies interested in prevalence rates may. As this thesis is interested in capturing the prevalence of bullying for its investigation into the role of cognition as a contributory mechanism, the empirical studies discussed in chapters 4 and 5 have used an 'either or' approach to combine mothers' and children's reports. This resulted in a binary measure of bullying victimisation being created using information from both informants to be used across both studies.

Dunedin Multidisciplinary Health and Development Study

No measures of bullying victimisation were collected within the Dunedin study cohort.

3.2.2 Bullying perpetration

Environmental Risk Longitudinal Twin Study and TEDS Peers

We assessed bullying perpetration using both mothers' and teachers' reports. Using items from the Child Behaviour Checklist (Achenbach, 1991a) we asked mothers whether their children had bullied or threatened others in the past 6 months. Using items from the Teacher's Report Form (Achenbach, 1991b) we asked teachers whether children had been cruel, mean or bullied others in the past 6 months. In order to capture all instances of bullying we combined mothers' and teachers' reports of bullying perpetration.

We assessed bullying perpetration using mothers' and teachers' reports of items from the Rutter Child Questionnaire. Both informants rated the item as being (0) 'not true', (1) 'somewhat or sometimes true', or (2) 'very or often true'. The reporting period was 6 months prior to the interview. *Bullying* was measured using the item 'cruel or nasty to other people', from the Rutter Child questionnaire (Rutter, Tizard, & Whitmore, 1970). In order to capture all instances of bullying we combined mothers' and teachers' reports of bullying perpetration.

Bullying perpetration was measured as a binary construct for the analyses in all empirical chapters. This analytical approach allowed for the findings to be interpreted with regards to children's involvement in bullying regardless of the severity of their bullying behaviours. This widened the implications for intervention and prevention schemes to include all those involved in bullying. Analyses for the third study also included a continuous measure of bullying in order to capture increased variability. This was done for the final step of the analyses, which tested whether bullying contributed to adjustment problems over and above the effects of antisocial behaviours. Increased variability was important as analyses were performed with both bullying and antisocial behaviours being in the same model to test for an independent effect. This increase of variance augmented the power to detect small effects.

3.3 Statistical approaches

All statistical analyses for this study were performed using the statistical package STATA 10.0 (STATA, 2007). The two overarching statistical approaches applied to all three empirical studies are detailed below. Firstly, statistical analyses using data collected from the E-Risk cohort was complicated because participants were twin pairs growing up in the same family. To control for these non-independent observations, analyses were adjusted with tests based on the sandwich or Huber/White variance estimator (Williams, 2000), a method that is available in the statistical package STATA 10.0 (STATA, 2007). Application of this technique addresses the assumption of independence of observations. It adjusts estimated standard errors and therefore accounts for the dependence in the data due to analysing sets of twins, and provides results that are robust to model assumptions (Lumley, Diehr, Emerson, & Chen, 2002).

Secondly, emotional and behavioural scales at ages 5, 7, 10 and 12 were used as independent and dependent variables in all three empirical chapters of this thesis. These scales were slightly skewed. Data was not transformed as it has been shown that OLS regression estimates are robust to skewed dependent variables in sample sizes as large as ours because the Central Limit Theorem ensures that the regression coefficients will be normally distributed (Lumley et al., 2002). Furthermore, the use of robust variance estimators (Rogers, 1993; Williams, 2000), used in this case to correct for non-independence in the data, also minimises the bias associated with non-normal distributions and heteroscedasticity. Detailed discussion of the statistical techniques employed for each of the three empirical studies are presented in the methods sections of the respective chapters (chapter 4-6).

3.3.1 Prospective longitudinal study design

The prospective longitudinal study design consists of following individuals and their families periodically through the course of their lives, which may include critical developmental periods or transition points (e.g., early childhood, the transition to school, the transition to adulthood). Through interviews and test batteries administered systematically across time, individual changes within social environments are captured to assess the impact they have in shaping future behaviours and general well being. This method allows for the investigation of psychological and biological factors in the distal and proximal environment involved in developmental processes. It assists in observing typical and atypical development and understanding the role of psychological and biological factors within the context of risk, resilience and contributors to the continuity of behaviours. Furthermore by capitalising on the chronological nature of the data, the direction of relationships can be established and provide information for building causal models (Menard, 2002). Longitudinal research is thus an appropriate methodological approach for studying developmental changes over time and the long-term effects of significant events on development (Loeber & Farrington, 1994). It is an integral tool in investigating underlying mechanism involved in shaping children's behaviour and the maintenance of physical and mental health.

3.3.2 Discordant monozygotic twin design

The discordant monozygotic (MZ) twin design is based on the fact that MZ twin pairs share 100% of their genetic background and also grow up sharing a number of environmental factors such as exposure to parental mental health problems, poverty and

chaotic home environments (Plomin, DeFries, McClearn, & McGuffin, 2001). As genetic and shared environmental factors are the same within a twin pair they can therefore not explain any differences observed amongst MZ twins. Differences between MZ twins can thus be traced back to exposure to unique environmental factors on which MZ twin pairs differ. For example one twin in a pair may have been bullied at school whilst the other twin has not. By investigating unique environmental exposure in relation to differences in behavioural development (i.e. differences in cognitive functioning), the discordant MZ twin design provides a unique tool for establishing a probable causal pathway between risk factors and children's behavioural development. The design allows for probable causal pathways to be determined by methodologically controlling for the influence of genes and shared environmental experiences on behavioural development. It can further examine whether such associations are environmentally mediated and provide an insight into mechanisms underlying the link between risk factors and behavioural development (Caspi et al., 2004; Vitaro, Brendgen, & Arseneault, 2009).

The discordant MZ twin design accounts for the confounding effect of genetic and environmental interplay (i.e. gene-environment correlation). As the genetic background is the same within a MZ twin pair, this design rules out the possibility that genetically influenced differences evoke different environmental exposure (Vitaro et al., 2009). Although the discordant MZ twin design accounts for genetic and shared environmental confounders, it does not rule out the possibility that there may be other correlated unique environmental factors which may explain the association between an observed unique environment and behavioural developmental outcome. For example, when investigating the unique environmental experience of being bullied with children's cognitive functioning, other correlated unique environmental factors such as friendship group may also be a contributor. It is thus important to account for these correlated factors when employing the discordant MZ twin design. Furthermore, although the discordant MZ twin design assists in inferring probable causation and can be applied to concurrent data, the strength of the design is best utilised within a longitudinal approach to allow for establishing the direction of effect between the unique environmental factor and the behavioural developmental outcome (Kendler & Baker, 2007). In conjunction with accounting for correlated unique environmental factors within a longitudinal study design, the discordant MZ twin design is therefore a strong method for investigating probably causal pathways.

4 A prospective longitudinal study of children's theory of mind and adolescent involvement in bullying ¹

4.1 Abstract

Background: Theory of mind allows the understanding and prediction of other people's behaviours based on their mental states (e.g. beliefs). It is important for healthy social relationships and thus may contribute towards children's involvement in bullying. The present study investigated whether children involved in bullying during early adolescence had poor theory of mind in childhood. **Method:** Participants were members of the Environmental Risk (E-Risk) Longitudinal Twin Study, a nationally-representative sample of 2,232 children and their families. We visited families when children were 5, 7, 10 and 12 years. We assessed theory of mind when children were 5 years using eight standardised tasks. We identified children who were involved in bullying as victims, bullies and bully-victims using mothers', teachers' and children's reports when they were 12 years. **Results:** Poor theory of mind predicted becoming a victim ($d=0.256$), bully ($d=0.253$) or bully-victim ($d=0.445$) in early adolescence. These associations remained for victims and bully-victims when child-specific (e.g., IQ) and family factors (e.g., child maltreatment) were controlled for. Emotional and behavioural problems during middle childhood did not modify the association between poor theory of mind and adolescent bullying experiences. **Conclusion:** Identifying and supporting children with poor theory of mind early in life could help reduce their vulnerability for involvement in bullying and thus limit its adverse effects on mental health.

¹ Chapter adapted from:

Shakoor, S., Jaffee, S.R., Bowes, L., Ouellet-Morin, I., Andreou, P., Happé, F., Moffitt, T.E., & Arseneault, L., (2012). A prospective longitudinal study of children's theory of mind and adolescent involvement in bullying *Journal of Child Psychology and Psychiatry* 53: 254-261

4.2 Introduction

Theory of mind (ToM) refers to the everyday understanding and prediction of other people's behaviours based on their mental states (e.g., beliefs). The development of these skills helps shape healthy social interactions and are considered important for decoding social cues and adjusting behaviours accordingly (Astington, 2001). As ToM skills underpin everyday social interactions, children who show delays in developing ToM may be at greater risk of involvement in bullying. Firstly, poor understanding of other people's intentions and emotions may jeopardise children's ability to detect social cues that indicate non-reciprocal interactions, thus placing them at risk of being victimised or exploited. Secondly, poor ToM may increase the risk of bullying victimisation by affecting children's ability to negotiate conflicts or stand up for themselves, resulting in being viewed as easy targets for threats and abuse. Thirdly, according to the social skills deficit model, children may be biased when they process social cues and interpret ambiguous situations as being hostile (Dodge, 1980). Children may engage in bullying behaviours as a way of dealing with perceived conflicts.

Given the robust associations between bullying and mental health problems (Arseneault et al., 2010), it is important to investigate mechanisms by which children become involved in bullying. A better understanding of the developmental processes that influence children's involvement in bullying may contribute to minimising its adverse effects on mental health. Studies investigating ToM amongst victims of bullying and bullies are limited. Findings mostly relate to bullies, with victims representing an additional group, and little consideration being given to bully-victims. Research shows that victims of bullying have poor ToM (Gini, 2006; Sutton et al., 1999). Findings are mixed for bullies with some studies reporting advanced ToM skills for bullies who play a leadership role (Renouf et al., 2010; Sutton et al., 1999) and others showing deficits (Monks et al., 2005). Being cross-sectional or spanning only a short period of time, these studies are limited in the extent to which they can inform about the influence of ToM on involvement in bullying over time. Using longitudinal data from 2,232 children, we tested the hypothesis that youth involved in bullying as victims, bullies and bully-victims in early adolescence had poor ToM in childhood.

The development of ToM is facilitated by factors including children's language abilities (Cutting & Dunn, 1999; Happé, 1995), conversations about emotions within the family (Dunn et al., 1991) and number of child-aged siblings (1–12 years) (McAlister &

Peterson, 2006). Reports of positive associations between the number of siblings and ToM are mixed, with suggestions that it may be the quality of the interactions with siblings that are important, rather than just their presence (Hughes & Ensor, 2005). Furthermore, ToM and involvement in bullying have common antecedents such as family disadvantage and quality of mother-child relationship (Bowes et al., 2009; Cutting & Dunn, 1999; Wolke et al., 2001). We therefore tested whether ToM was independently associated with involvement in bullying over and above child-specific and family factors.

Children with emotional and behavioural problems are more likely to have had a history of poor ToM (Hughes & Ensor, 2005) and to have been involved in bullying (Arseneault et al., 2006; Barker et al., 2008b). This highlights adjustment problems as a potential mechanism that may exacerbate the effect of poor ToM upon children's involvement in bullying. For example, children with poor ToM who find it difficult to socialise and are therefore seen as being 'odd', may become easier targets for victimisation if they are also highly anxious and therefore unlikely to stand up for themselves. Similarly, children with poor ToM who have difficulty making the correct attributions for others' behaviour may especially be likely to bully others if they are already prone to aggression. Using prospective data across four time points, we investigated if having adjustment problems in middle childhood moderated the risk of being involved in adolescent bullying amongst children with poor ToM.

4.3 Method

Sample

Participants were members of the Environmental Risk (E-Risk) Longitudinal Twin Study, as described in chapter 3.

Age 5 children's theory of mind (ToM)

We administered a total of eight ToM tasks in a set order of increasing difficulty when children were 5 years old (Hughes et al., 2005). All test questions were presented in a forced-choice format (or with a forced-choice prompt) and were accompanied by at least one control question to check story comprehension and recall. Children only received credit on a test question if they also passed the accompanying control questions(s). Four 'standard' ToM tasks tapped children's ability to attribute a 1st order false-belief to a story character (e.g., a mistaken belief about an object's identity or

location). Four ‘advanced’ ToM tasks tapped children’s ability to make inferences from an attributed false -belief (e.g., to predict how a character would feel as a result of his/her false-belief) or to attribute a 2nd order false -belief (i.e. a mistaken belief about a belief) to a story character. Children who responded correctly to ‘advanced’ ToM questions were asked to justify their response and received a bonus point for each correct justification. Children’s scores across the eight different tasks and the four bonus points were summed, ranging from 0 to 12 (M=4.52, SD=3.28) where lower scores represent poor ToM. The standard and advanced false-belief tasks show acceptable one month test-retest reliability (>0.7) in 5-year-old children across a wide range of abilities (Hughes et al., 2000).

Age 5 covariates

To assess children’s *Intelligence Quotient (IQ)*, each child was individually tested at age 5 using a short form of the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R) (Wechsler, 1990) comprising Vocabulary and Block Design subtests. Children’s IQs were prorated following procedures described by Sattler (1992). Scores ranged from 55 to 151 (M=100, SD=15), where lower scores represented poor IQ.

We assessed children’s *early involvement in bullying* during interviews with mothers when children were 7 years. We asked mothers whether either twin had been bullied by another child between 5 and 7 years, as described in chapter 3. A total of 19% of children had been bullied by 7 years (N=411). We also asked mothers and teachers whether children had been bullying others at age 7. A child was considered to be a bully if reported by either source. A total of 24% of children bullied others according to mothers and/or teachers (N=519). We combined groups of children who had been victimised by bullies and children who had been bullying others to generate three groups of children involved in bullying; victims (13%, N=273), bullies (17%, N=381) and bully-victims (6%, N=138).

We assessed *emotional and behavioural problems* when children were 5 years using the Child Behaviour Checklist for mothers (Achenbach, 1991a) and the Teacher’s Report Form for teachers (Achenbach, 1991b). Mothers were given the instrument as a face-to-face interview and teachers responded by mail. The reporting period was 6 months before the interview. Informants were asked to rate each item as being ‘not true’,

‘sometimes true’ or ‘very true’. Mothers’ and teachers’ reports were standardised and summed to create a composite measure. The emotional problems scale is the sum of items on the Withdrawn and Anxious/Depressed scales, including items such as ‘cries a lot’, ‘withdrawn, doesn’t get involved with others’ and ‘worries’. In order to maximise the reliability and validity of our measures of emotional and behavioural problems we combined mothers’ and teachers’ reports. Moreover as mothers and teachers see children in different situations and setting, they both provide unique and complementary information about children’s behaviour (Loeber, Green, Lahey, & Stouthamer-Loeber, 1991). Taking both informants’ accounts into consideration will provide a more holistic view of children’s problems. Reports from mothers’ and teachers were summed as simple combination rules work as well, if not better than, more complicated ones (Bird, Gould, & Staghezza, 1992; Piacentini, Cohen, & Cohen, 1992). Combined mother and teacher scores ranged from 0 to 58 ($M=12.13$, $SD=8.35$). The internal consistency was 0.85. The behavioural problems scale is the sum of items in the Aggressive and Delinquent behaviours scales (minus the item that assessed bullying), including items such as ‘argues a lot’ and ‘is defiant, talks back’. Combined mother and teacher scores ranged from 0 to 93 ($M=17.97$, $SD=13.28$). The internal consistency was 0.92.

Maternal warmth was assessed at age 5 using Maternal Expressed Emotion (EE) scales (Caspi, et al., 2004), based on the Five Minute Speech sample (FMSS) method (Magana, Goldstein, Karno, Miklowitz, & Falloon, 1986). Trained interviewers asked mothers to describe each of her children (‘for the next 5 minutes, I would like you to describe (child) to me; what is (child) like?’). The mother was encouraged to talk freely with few interruptions. Two trained raters coded the EE tapes according to guidelines set down by the FMSS scoring manual as modified for use with preschool children (Barnes-McGuire & Earls, 1994). The raters underwent 2 weeks of training in coding procedures, and the same rater was used to code twins in the same family. Inter-rater reliability was established by having the raters individually code a test- standard audiotape describing 40 children. Maternal warmth is a global measure of the whole speech sample and was assessed by the tone of voice, spontaneity, sympathy and/or empathy towards the child. Warmth was coded on a six-point scale. ‘*High warmth*’ (5) and ‘*moderately high warmth*’ (4) were coded when there was definite and clear-cut tonal warmth, enthusiasm, interest in, and enjoyment of the child. For example, ‘she is a delight, she is so happy, I love taking her out, she is my ray of sunshine’ was coded as a 5. ‘*Moderate warmth*’ (3), was coded when there was definite understanding, sympathy,

and concern but only limited warmth of tone, for example, 'I worried about her when she went to school, I thought she may have difficulty in mixing, and I felt sorry for her'. '*Some warmth*' (2), was coded when the mother showed a detached, rather clinical approach and little or no warmth of tone, but moderate understanding, sympathy, and concern. For example, an interview with comments along the lines of 'she's alright' with little substantiation would have received this rating. '*Very little warmth*' (1), was rated when there was only a slight amount of understanding, sympathy, concern, enthusiasm about, or interest in the child. '*No warmth*' (0), was reserved for mothers who showed a complete absence of the qualities of warmth as defined. Scores ranged from 0 to 5 ($M = 3.30$, $SD = 1.00$). Scores were recoded to create an index of risk.

Child maltreatment was assessed at age 5 separately for each twin by interviewing mothers with the standardised clinical interview protocol from the Multi-Site Child Development Project (Jaffee, Caspi, Moffitt, & Taylor, 2004), which has established validity and reliability in this sample and others (Dodge, Bates, & Pettit, 1990). Mothers were interviewed instead of ascertaining cases from Child Protective Service registers for three reasons. First, official record data identify only a small proportion of cases, which may be a biased, unrepresentative subset (Walsh, McMillan, & Jamieson, 2002; Widom, 1988). Second, because of time delays in detection, investigation, and legal proceedings against perpetrators, official record data sources tend not to record children as confirmed cases until older ages. Third, searching child protection records for this sample would have required parental consent, placing record data at the same potential risk of parental concealment as mothers' reports. The interview protocol was designed by Dodge and colleagues (Dodge et al., 1990; Dodge et al., 1995; Lansford et al., 2002) to enhance mothers' comfort with reporting valid child maltreatment information while also meeting researchers' legal and ethical responsibilities for reporting. Under the United Kingdom's Children Act (Health, 1989), our responsibility was to secure intervention if maltreatment was current and on going. At the start of the interview about discipline and maltreatment, the interviewer explained to the mother that if she reported maltreatment that had occurred in the child's first four years and was not on going, that information could remain confidential. However, if she reported maltreatment that occurred in the year prior to the interview and the risk to the child was on going, the study would be under legal obligation to assist the family to obtain help. Thus, when mothers gave informed consent to proceed with the interview, they understood that a report of recent, on-going maltreatment would constitute a request for

help (if the maltreatment was not already known to authorities). The interviewer did not ask directly about the timing of incidents, and therefore mothers who wished to report maltreatment while avoiding intervention could have opted to describe maltreatment as happening in the past. The protocol included standardised probe questions such as, ‘when [name] was a toddler, do you remember any time when he or she was disciplined severely enough that he or she may have been hurt?’ and ‘did you worry that you or someone else [such as a babysitter, a relative or a neighbour] may have harmed or hurt [name] during those years?’ (1% of mothers declined to answer the questions). Questions were carefully worded to avoid implying that the mother was the perpetrator, so mothers might feel more willing to report that a child had been maltreated. In cases in which mothers reported any maltreatment, interviewers probed mothers for details about the incident and recorded notes. There was a need to intervene on behalf of 15 families. Almost all current cases of maltreatment were already known to government home health visitors, the family’s general practitioner, or child protection teams, although very few of the cases had been officially registered. Interviewers coded the likelihood that children had been physically maltreated based on the mothers’ narratives. Two independent raters (a senior investigator with clinical psychology background and a project leader with experience in social service) reviewed the notes for all families where maltreatment was reported to confirm the interviewers’ ratings. On the basis of the mother’s report of the severity of discipline and the interviewer’s rating of the likelihood that the child had been maltreated, children were coded as having not been, possibly been, or definitely been maltreated. Examples of possible physical maltreatment in the E-Risk sample (12%, N = 273 children) included instances in which the mother reported that she smacked the child harder than she intended to and left a mark or bruise, or cases in which social services were contacted by either schools, neighbours, or family members out of concern that the child was being maltreated. Examples of definite maltreatment included children who were beaten by a teenaged stepsibling, were punished by being burnt with matches or thrown against doors, had injuries (e.g., fractures or dislocations) from neglectful or abusive care, or were formally registered with a social services child protection team. The prevalence of such definite, serious maltreatment as defined in this sample was 2% (N = 34 children).

Number of siblings was measured at age 5 using the life history calendar, a visual method used to recall life events, their timing and duration (Caspi et al., 1996). During their interviews, mothers were asked to provide information about the total number of

siblings their twins had excluding co-twins. This included both biological and non-biological siblings living in the home. The total number of siblings ranged from 0 to 10. 26% (N=572) of twins had no other siblings, 36 % (N=792) had one other sibling and 39% (N= 868) had two or more siblings.

Socioeconomic status (SES) was measured at age 5 using a standardised composite of income, education, and social class (Trzesniewski, Moffitt, Caspi, Taylor, & Maughan, 2006). The three SES indicators were highly correlated (r s ranged from 0.57 to 0.67, all p s < 0.05) and loaded significantly onto one latent factor (factor loadings, 0.80, 0.70, and 0.83 for income, education, and social class, respectively). Scores ranged from 1 to 3, with the lower score representing socioeconomic deprivation.

Age 7 and 10 emotional and behavioural problems

We assessed *emotional and behavioural problems* when children were 7 and 10 years similarly to when they were 5 years. Combined mother and teacher scores of emotional problems at age 7 ranged from 0 to 66 (M=11.60, SD=8.56) and from 0 to 67 (M=11.57, SD=8.90) at age 10. The internal consistency was 0.87 at age 7 and 0.89 at age 10. Combined mother and teacher scores of behavioural problems at age 7 ranged from 0 to 98 (M=15.99, SD=13.23) and from 0 to 113 (M=15.35, SD=14.00) at age 10. The internal consistency was 0.94 at age 7 and 0.92 at age 10. Emotional and behavioural problems at age 7 and 10 were fairly stable with correlations of 0.49 for emotional problems and 0.64 for behavioural problems across the two ages.

Age 12 adolescent involvement in bullying

We assessed experiences of *bullying victimisation* using both mothers' and children's reports at age 12, as described in chapter 3. Age 12 reports of bullying victimisation from the two informants were summed to create two groups: non-victim (53%, N=1,138), and victims as reported by either or both mothers and children as 'occasionally' or 'frequently' (47%, N=1,008). The inclusion of both mothers' and children's reports of bullying victimisation allow us to capture bullying incidents that could easily go unnoticed by mothers or be under-reported by children. This is reflected in our high prevalence rate.

We assessed *bullying perpetration* at age 12 using items from the Child Behaviour Checklist (Achenbach, 1991a) and Teacher's Report Form (Achenbach, 1991b). A child

was considered to be a bully if so reported by either mother or teacher. A total of 471 children (22%) bullied others according to mothers and/or teachers.

Based on information regarding bullying victimisation and perpetration, we created three groups: victims (33%, N=704) are children who have been victimised but who have not bullied others; bullies (8%, N=167) are children who have only bullied others; and bully-victims (14%, N=304) are children who have been bullied and have bullied others. Children not involved in bullying either as victims, bullies, or bully-victims form the comparison group (45%, N=971).

Statistical analyses

Firstly, we tested whether poor ToM at age 5 was associated with children becoming involved in bullying at age 12. We used multinomial logistic regression analyses predicting victims, bullies and bully-victims, with children not involved in bullying as the comparison group. We tested if the associations differed by gender by including an interaction term (gender x ToM) in the regression models. The results indicated non-significant effects thus all analyses were conducted collapsed across gender. We further examined the independent associations between ToM and adolescent involvement in bullying controlling for the child-specific factors in one model and family factors in another.

Secondly, we tested whether adjustment problems during middle childhood (7 and 10 years) played a role in the association between poor ToM at 5 and later involvement in bullying at 12. We examined if emotional and behavioural problems in middle childhood moderated the risk of adolescent involvement in bullying amongst children with poor ToM. Using multinomial logistic regression models predicting involvement in bullying, we first tested whether emotional or behavioural problems had an independent effect on children's involvement in bullying. We then tested for a moderating effect by including interaction terms between ToM and emotional and behavioural problems in the regression models.

4.4 Results

Did adolescents involved in bullying have poor ToM as children?

Compared to adolescents not involved in bullying, age 12 victims, bullies and bully-victims had poorer ToM at age 5 (Table 3). We observed significantly poorer ToM

among victims ($d=0.256$), bullies ($d=0.253$) and especially bully-victims ($d=0.445$). Even after controlling for child-specific and family factors (Table 4), multivariate analyses indicated that poor ToM was independently associated with victim and bully-victim status at age 12. Amongst bullies the association between poor ToM and being a bully was statistically accounted for by the confounding effects of SES and child maltreatment.

Table 3: Associations between age 5 theory of mind and involvement in bullying at age 12

Involvement in bullying	Theory of mind		
	Mean (SD)	RR (95% CI)	Effect size (d)
Not-involved	5.056 (3.307)	-	-
Victims	4.220 (3.228)	0.926 (0.895, 0.957)	0.256
Bullies	4.237 (3.158)	0.930 (0.884, 0.979)	0.253
Bully-victims	3.639 (3.059)	0.876 (0.837, 0.916)	0.445

Note: Not-involved children were the comparison group in multinomial logistic regression analyses adjusted for gender. CI= confidence intervals; SD= standard deviation; RR = relative risk ratio

Table 4: Associations between age 5 theory of mind and involvement in bullying at age 12 controlling for child-specific and family factors

	Groups of children involved in bullying		
	Victims RR (95% CI)	Bullies RR (95% CI)	Bully-victims RR (95% CI)
Bivariate association with ToM	0.926 (0.895, 0.957)	0.930 (0.884, 0.979)	0.876 (0.837, 0.916)
Controlling for age 5 child-specific factors			
ToM	0.934 (0.900, 0.969)	0.944 (0.888, 1.004)	0.930 (0.883, 0.980)
Gender	0.951 (0.748, 1.209)	0.643 (0.442, 0.934)	0.671 (0.476, 0.946)
IQ	1.000 (0.992, 1.009)	1.004 (0.990, 1.018)	0.985 (0.974, 0.997)
Emotional problems	1.006 (0.991, 1.020)	1.001 (0.980, 1.022)	1.011 (0.992, 1.029)
Behavioural problems	1.026 (1.015, 1.039)	1.042 (1.027, 1.058)	1.062 (1.048, 1.076)
Early involvement in bullying as a:			
Victim	1.656 (1.210, 2.266)	1.603 (0.921, 2.790)	2.211 (1.404, 3.483)
Bully	0.899 (0.652, 1.238)	1.752 (1.100, 2.791)	2.312 (1.572, 3.402)
Bully-victim	2.894 (1.478, 5.667)	4.762 (1.953, 11.68)	10.073 (4.972, 20.404)
Controlling for age 5 family factors			
ToM	0.929 (0.895, 0.964)	0.956 (0.903, 1.012)	0.925 (0.881, 0.972)
Maternal warmth	0.961 (0.849, 1.087)	0.891 (0.733, 1.082)	0.701 (0.598, 0.822)
Child Maltreatment	1.095 (0.761, 1.574)	1.695 (1.033, 2.782)	1.656 (1.077, 2.545)
Number of siblings	0.966 (0.877, 1.065)	1.027 (0.853, 1.235)	1.150 (1.028, 1.287)
SES	0.879 (0.748, 1.033)	0.766 (0.586, 1.003)	0.628 (0.497, 0.794)

Note: Not-involved children were the comparison group in multinomial logistic regression analyses. CI= confidence intervals; RR= relative risk ratio

Do adjustment problems in middle childhood modify the association between early ToM and adolescent involvement in bullying?

We explored whether the association between poor childhood ToM and adolescent involvement in bullying varied according to the presence of emotional and behavioural problems in middle childhood. We did not find any significant moderating effects of adjustment problems. However, having emotional and behavioural problems during middle childhood had an independent effect upon children becoming involved in bullying (Table 5). Findings indicated that the likelihood of children with poor ToM becoming involved in bullying during adolescence either as victims, bullies or bully-victims was the same whether or not they had emotional or behavioural problems in middle childhood.

Table 5: Associations between age 5 theory of mind and involvement in bullying at age 12 testing for the moderating effect of middle childhood adjustment problems

	Groups of children involved in bullying		
	Victims RR (95%CI)	Bullies RR (95%CI)	Bully-victims RR (95%CI)
<i>Moderating effect</i>			
ToM	0.941 (0.909, 0.974)	0.948 (0.899, 1.000)	0.907 (0.863, 0.952)
Age 7-10 Emo	1.053 (1.034, 1.072)	1.045 (1.019, 1.072)	1.083 (1.060, 1.107)
ToM * Emo	0.998 (0.991, 1.005)	0.998 (0.991, 1.005)	0.999 (0.993, 1.006)
ToM	0.936 (0.903, 0.971)	0.960 (0.911, 1.012)	0.908 (0.862, 0.956)
Age 7-10 Behav	1.032 (1.017, 1.047)	1.078 (1.057, 1.099)	1.112 (1.092, 1.132)
ToM * Behav	1.001 (0.997, 1.004)	1.001 (0.996, 1.005)	1.002 (0.998, 1.007)

Note: Analyses were conducted controlling for the confounding effects of gender, and early involvement in bullying. Not-involved children were the comparison group in multinomial logistic regression analyses. For the moderation analyses ToM, emotional and behavioural problems were centred. CI= confidence intervals; RR = relative risk ratio. Emo = Emotional problems, Behav = Behavioural problems

4.5 Discussion

Findings from our nationally-representative cohort showed that adolescent victims, bullies and bully-victims had poor ToM in early childhood. Poor ToM contributed to the risk of children becoming victims and bully-victims in early adolescence over and above child-specific and family factors such as low IQ, child maltreatment, maternal warmth and gender. This risk was not moderated by children's emotional and

behavioural problems during middle childhood. Poor ToM in childhood appears to be a robust developmental marker for later victim or bully-victim status. Our findings suggest that targeting developmental delays in ToM early in children's schooling years could help reduce their vulnerability for becoming involved in bullying as they embark on their teen years.

Victims and bully-victims

Consistent with other studies, our findings indicated an association between victimisation and poor ToM (Gini, 2006; Sutton, et al., 1999). Moreover, we found a prospective longitudinal association whereby youth who had poor ToM in early childhood were more likely to become victims of bullying in early adolescence. Our findings extend those of previous studies by showing that children with poor ToM are more likely to become victims of bullying in early adolescence over and above the effects of other factors. In particular, the independent risk posed by ToM over and above IQ is of interest. Firstly, it demonstrates that although IQ and ToM are correlated ($r = 0.441$), ToM has an independent effect on later involvement in bullying and should therefore be considered as an independent cognitive domain for studies of bullying. Secondly, our findings suggest that there is something specific about children's inability to understand other people's mental states, as opposed to general cognitive/intellectual difficulties, that place them at an increased risk of being victimised. For example, the inability to understand others' mental perspective may contribute to victims' behaviours being viewed as confrontational, insulting and irritating by their peers (Olweus, 1993).

Our findings showed that adolescent bully-victims had the poorest ToM at age 5 years. Bully-victims are the group of children involved in bullying who fare the worst, with the highest level of adjustment problems (Nansel, et al., 2001) and our findings highlight ToM as a potential early marker of this highly vulnerable group. Our observation of poor ToM amongst victims and bully-victims, suggests that there may be differences in the manner in which poor ToM influence children's social relationships, consequently affecting their risk of becoming victims or bully-victims. For example, because children with poor ToM find it difficult to consider other people's perspectives when decoding social cues, they may have to rely on their own experiences and related apprehensions. These experiences may be negative resulting in children interpreting ambiguous situations as threatening and responding aggressively (Runions & Keating, 2007). This could explain why some victims of bullying end up bullying others too. Our

findings of poor ToM amongst bully-victims may help in further understanding why children who are victims go on to bully others (Barker et al., 2008b).

Collectively our findings demonstrated that having poor ToM in early childhood contributed towards children's risk of being victims and bully-victims at age 12 over and above the risk posed by involvement in bullying at age 5, as well as other child specific and family factors. The independent effect of ToM suggests that ToM contributes to new bullying victimisation over and above chronic bullying. The analyses reported in this chapter would have benefited by including a later measure of ToM and investigating the associations between changes in ToM and children's later involvement in bullying. This would have allowed for the examination of ToM within a developmental sequence. However as a measure of ToM was only available for one time point in the E-Risk study, this could not be tested within this study.

Bullies

Adolescent bullies also had poor ToM in childhood. However, the risk associated with having poor ToM was statistically explained by child maltreatment and SES, indicating that growing up in deprivation and being maltreated overrides the risk posed by having poor ToM for becoming a bully. Our findings support associations between SES, child maltreatment and bullying (Shields & Cicchetti, 2001; Wolke et al., 2001), and suggest that for children with poor ToM, these factors play a more influential role in children's risk of becoming bullies. Evidence showing that family factors are associated with both ToM and involvement in bullying further emphasises the need to take these factors into account when conducting research and setting up intervention programmes. Targeting only children's ToM to reduce their risk of being bullies may not be sufficient.

The observation that bullies had poor ToM in childhood does not support the notion of bullies being 'skilled social manipulators' with high levels of ToM (Sutton, et al., 1999). One possible reason for this differentiation may lie in the characterisation of the bullies. Previous studies distinguished between children who initiate bullying as a 'ring leader' from other bullies (Sutton, et al., 1999). We did not make this distinction with E-Risk participants. Advanced ToM skills might be important for 'ring leaders', specifically as this role involves elements of the manipulation of others to engage in negative behaviours. The same, however, may not be true for children who are being led by others to bully. Furthermore, research shows that as children get older, prevalence

rates of indirect bullying behaviours such as social exclusion increase (Craig, et al., 2009). This element of manipulation could require an understanding of others' mental states and ToM skills may become necessary for some forms of indirect bullying behaviours at an older age. Examining various forms of bullying behaviours and taking family factors into account may help clarify mixed findings leading to better understanding of the role of ToM in the development of bullying behaviours.

The role of adjustment problems

Adjustment problems in middle childhood did not moderate the associations between poor ToM and adolescent involvement in bullying although they contributed to children's risk of being involved in bullying independently of having poor ToM. This suggests that other mechanisms independent of emotional and behavioural problems may help explain how poor ToM increases children's risk of becoming victims or bully-victims. Poor ToM has been associated with poor emotion recognition, poor communication, and poor executive function in children. Each of these plausibly plays an important role in peer interaction and bullying involvement (Filippova & Astington, 2008; Henning, Spinath, & Aschersleben, 2011). Poor ToM has also been documented amongst individuals with atypical neurological development (e.g. dys/agenesis of the corpus callosum, (Booth, Wallace, & Happé, 2011); right hemisphere damage, (Siegal & Varley, 2002). Poor ToM at age 5 may be a marker for other cognitive or neural abnormalities contributing to the risk of later involvement in bullying.

Limitations

The present study has some limitations. First, our measure of involvement in bullying did not distinguish between different types of bullying behaviours and victimisation (i.e. relational vs. physical bullying). This would have allowed us to test further the role of ToM in relation to the type and complexity of different bullying behaviours. Second, we studied a cohort of twins and we cannot be certain that our results generalise to singletons. Similar prevalence rates of involvement in bullying between the E-Risk Study and samples of singletons suggest that our findings are not specific to twins (Craig, et al., 2009). Furthermore, although there is evidence to suggest that children with siblings are more likely to perform better on ToM tasks (McAlister & Peterson, 2006) the same has not been shown for twins (Cassidy, Fineberg, Brown, & Perkins, 2005).

Implications

Our findings highlight the importance of early differences in social cognition amongst children who later become involved in bullying. Identifying such risk factors and underlying mechanisms will enhance our knowledge of the aetiology of involvement in bullying and provide more specific targets for interventions. Supporting children with poor ToM early on in their schooling years may help improve their social interactions and reduce their vulnerability for later involvement in bullying. For example, evidence suggests that discussing scenarios of false-belief and mental states improves children's understanding of false-belief and use of mental state terms (Appleton & Reddy, 1996; Guajardo & Watson, 2002). Employing such training strategies could help improve ToM skills, which in turn may help reduce children's vulnerability for becoming victims or bully-victims later in life.

5 Internal, global and stable: Negative attributional styles of bullied children

5.1 Abstract

Background: Attribution styles are used for the understanding of behaviours and occurrence of events. Exposures to negative life events in childhood contribute to the development of biased attributional styles that have a detrimental effect upon mental health. The present study investigated (1) whether bullied children differed from non-bullied children in their use of attributional styles using a discordant monozygotic twin design; (2) whether children's attributional styles are associated with their adjustment problems. **Method:** We selected 88 12-year old children from the Environmental Risk (E-Risk) Longitudinal Twin Study. We collected information about children's bullying experiences using mothers' and children's reports when children were 12 years. We assessed attributional styles at age 12 using the cognitive attribution style questionnaire (CASQ) during children's visit to the research centre. **Results:** Bullied children interpreted the cause of negative events as being more internal, global and stable when compared to their non-bullied co-twin. These differences could not be explained by genetic factors, shared family factors or pre-existing individual factors. Children who used biased attribution styles when interpreting the cause of negative events had higher levels of emotional and behavioural problems. **Conclusion:** Results from our discordant MZ design suggests a causal association between being bullied and having biased attributional styles. Supporting bullied children with developing healthy attributional styles via cognitive based techniques could help reduce their vulnerability for developing biased attributional styles and thus limit its adverse effects on mental health.

5.2 Introduction

As discussed in chapter 2 cognitive skills are important for the understanding of the social environment and consequently the successful development of mental health. Demonstrated by the empirical findings in chapter 4, cognitive skills-- namely theory of mind -- is an important predictor of children being bullied in adolescence. However, the question remains whether cognitive skills are only important as a predictor of bullying victimisation or whether they can also be influenced by children's bullying experiences and be an important mechanism underlying the development of adjustment problems amongst bullied children.

Examples of such cognitive skills are attributional styles. Attributional styles are an important tool used to understand why people behave the way that they do and why events occur (Aronson, Wilson, & Akert, 2002). Children and adolescents who employ attributional styles which result in feelings of negativity are especially prone to adjustment problems (Jacobs et al., 2008) and as bullied children have elevated levels of adjustment problems (Arseneault et al., 2010), these styles may be of interest in understanding the development of bullied children. This chapter investigates whether being bullied has an impact on children's attributional styles. Furthermore it explores whether attributional styles can be a mechanism through which children who are bullied develop adjustment problems. Using a sample of 44 monozygotic (MZ) twin pairs discordant for bullying victimisation, the present study firstly tested whether bullied children differ from their non-bullied co-twins on their attributional styles. Secondly, this study examined whether children with negative attributional styles have increased levels of emotional and behavioural problems.

An attributional style is generally stable through life, with greatest variability occurring in childhood. Childhood is therefore a crucial period of time for the development of healthy attributional styles (Nolen-Hoeksema, et al., 1992) and identifying factors that contribute to the development of biased attributional styles. In particular, exposure to adverse life events in childhood can contribute to the development of negative attributional styles (Peterson & Seligman, 1984). Being exposed to adverse life events that are severe or repeated may directly contribute to the development of negatively biased attributional styles, as over time children may internalise the belief that adverse life events are stable, have negative consequences, and are attributable to themselves (Rose & Abramson, 1992). For example, a child who has been victimised may initially

attribute the cause of this as being due to the aggressor being angry that day. After repeatedly being victimised, this child may think that he/she is being targeted because there is something wrong with him/her that is making the aggressor hurt them. This notion of adverse life events being associated with the development of negative attributional styles has been empirically supported, in particular amongst children who have been maltreated (Gibb, 2002). Moreover, two longitudinal studies have shown that experiencing adverse life events in childhood predicted negative attributional styles over time, after taking into account children's prior level of depression (Nolen-Hoeksema, et al., 1992), early attributional styles and maternal history of depression (Garber & Flynn, 2001).

As children reach school age, the contexts in which they may be victimised broadens to include peers. Like maltreatment in the home environment, victimisation by peers may also contribute to the development of negative attributional styles. For example, in instances of both bullying and maltreatment, the perpetrator's intention to harm is evident by his/her behaviours. Both forms of victimisation are experienced repetitively over time and in the presence of a power imbalance whereby it is more difficult for children to defend themselves. Furthermore, bullying can be chronic, intense and consistent, all of which are important factors in determining the impact of interpersonal experiences on attributional styles (Haines, et al., 1999). The uncontrollable and repetitive nature of bullying maps itself on global (general across situations) and stable (consistent over time) attributional styles. Moreover, as some bullying behaviours target personal attributes (i.e. teasing or calling names), a child may make internal attributions for the bullying (i.e. it's my fault they made fun of me, my ears stick out). Empirical evidence showing associations between bullying victimisation and negative attributional styles have found that children and young adults who had been bullied both verbally and physically in childhood reported more negative attributional styles in comparison to those who had not been bullied (Gibb et al., 2004; Mezulis et al., 2006).

Although significant associations have been reported between bullying victimisation and negative attributional styles, existing findings do not allow for causal inferences due to limitations in the employed study designs, for example studies have relied on retrospective accounts of peer victimisation (Mezulis et al., 2006), thus limiting causal inferences based upon temporal priority. Limitations in the ability to make causal inferences make it difficult to rule out alternative explanations for any observed

associations between victimisation and cognitive attributional styles. For example there is some evidence to suggest that children's adjustment problems may contribute towards the maladaptive formation of cognitive attributional styles (Nolen-Hoeksema, et al., 1992), and as victimised children are at a greater risk of having early adjustment problems (Arseneault et al., 2006) it may be that it is early adjustment problems that are contributing to the risk of negative attributional styles and not victimisation. This highlights not only the importance of having study designs that allow for causal inferences to be drawn, but also those which take a number of confounders into consideration. One way of addressing the issue of causal inferences, and controlling for a large number of confounders, is to use a discordant monozygotic (MZ) twin design. As MZ twins are genetically identical and grow up in the same family, any differences between them are due to environmental factors that are unique to each twin. By employing a discordant MZ twin design for bullying victimisation, where one twin is bullied and the other is not, and both are similar on other factors, we are able to infer that any differences that are observed between the twins (i.e. differences in attributional style) are due to unique child specific factors, one of which is the experience of being bullied. In the present study, using a sample of 44 monozygotic twin pairs discordant on their experiences of bullying, we tested whether bullied twins differ from their non-bullied co-twins on their attributional styles.

The identification of factors which contribute towards the formation of negative attributional styles are of particular importance due to the well-documented association between negative attributional styles and adjustment problems, in particular depressive symptoms. Empirical support has primarily come from cross-sectional studies (Gladstone & Kaslow, 1995; Jacobs et al., 2008), which have all reported increased levels of depressive symptoms amongst children and adolescents with negative attributional styles. There is also evidence from longitudinal studies that suggest that negative attributional styles contribute towards the development of depression (Garber et al., 2002; Nolen-Hoeksema et al., 1992). There is a smaller literature showing that negative attributional styles are a risk factor for behaviour problems as well. Studies have found similar associations between negative attributional styles (internal, global and stable) and behavioural problems as those found with emotional problems (Hankin & Abramson, 2002; Rowe et al., 2006; Weiss et al., 1998). Furthermore, the common co-occurrence of emotional and behavioural problems (Angold, Costello, & Erkanli, 1999) suggests that there may be underlying contributory mechanisms which are

common to both forms of adjustment problems. The current study investigated whether children's attributional style is associated with their emotional and behavioural problems at age 12.

5.3 Method

Sample

Participants were members of the TEDS Peers (Promoting Enjoyable and Engaging Relationships at School) Study, as described in chapter 3. Twin pairs who were highly discordant in their bullying experiences and scored a suitability score of 9 or more (as described in chapter 3) were selected for this study. Based upon this selection a total of 44 (43% males) monozygotic 12 year old twin pairs who were highly discordant on bullying victimisation were included in this study; thus one twin had been the victim of bullying ($n = 44$) whilst the other twin had not ($n = 44$).

Age 12 cognitive attributional style

We assessed children's *cognitive attributional styles* using the Children's Attributional style Questionnaire-Revised (CASQ-R) (Thompson, Kaslow, Weiss, & Nolen-Hoeksema, 1998). During their visits to the laboratory, using a computer based task we presented children with 24 forced-choice items consisting of 12 positive and 12 negative hypothetical events (e.g. 'I get an A on a test' or 'I get a bad mark in school'). We asked children to select one of two provided statements that best explain why the described event happened. For example when presented with the event 'I get a bad mark in school', children were asked to select if this occurred because (a) 'I am not a good pupil' or (b) 'Teachers give hard tests'. Items were divided into one of three subscales which assessed attributional styles used to explain the cause of events; (1) internal-external: attribute the cause of events to the self or to factors external to the self; (2) global-specific: attribute the cause of events to general situations or to a specific situation, and (3) stable-unstable: attribute the cause of events as being consistent over time or inconsistent over time. The CASQ-R was scored by assigning a 1 to each internal, global, or stable response and a 0 to each external, specific, or unstable response. Scores were derived by summing across the items for each of the three subscales, separately for negative and positive events. Scores for negative events ranged from 0 to 3 for all three subscales, internal ($M = 0.74$ $SD = 0.73$), global ($M = 0.47$ $SD = 0.71$), and stable ($M = 1.08$ $SD = 0.90$). A total composite score for negative events was created by summing the scores across the three subscales. Total scores for the

negative events scale ranged from 0 to 6 ($M= 2.28$ $SD= 1.55$). Higher scores on the negative scale indicate a negatively biased attributional style for negative events, whereby the cause of negative events are attributed to factors within the self (internal), general across situations (global) and consistent over time (stable). Scores for positive events ranged from 0 to 4 for all three subscales, internal ($M= 2.55$ $SD= 1.09$), global, ($M=2.24$ $SD=0.97$), and stable ($M=2.98$ $SD=0.92$). A total composite score for positive events was created by summing the scores of the three subscales. Total scores for the positive events scale ranged from 1 to 11 ($M= 7.30$ $SD= 1.83$). Lower scores on the positive scale indicate a negatively biased attributional style for positive events, whereby the cause of positive events was attributed to factors outside of the self (external), specific to certain situations (specific) and inconsistent over time (unstable).

For the remainder of the chapter, the term negative attributional styles will be used to refer to the attribution of negative events as being internal, global and stable, and positive events as being external, specific and unstable.

Age 12 adjustment problems

We assessed *emotional and behavioural problems* when children were 12 years using the Child Behaviour Checklist for mothers (Achenbach, 1991a) and the Teacher's Report Form for teachers (Achenbach, 1991b), as described in chapter 5. Mothers and teachers reports were standardised and summed to create a composite measure. For this study sub-sample, combined mother and teacher scores for emotional problems at age 12 ranged from 0 to 45 ($M=12.83$, $SD=10.36$). For behavioural problems, scores at age 12 ranged from 1 to 81 ($M=18.83$, $SD=15.44$).

Age 5 Confounders

Intelligence Quotient (IQ) was individually tested at age 5 years using a short form of the Wechsler Preschool and Primary Scale of Intelligence-Revised WPSSI-R (Wechsler, 1990). Using two subtests (Vocabulary and Block Design), children's IQs were prorated following procedures described by (Sattler, 1992). Scores ranged from 64 to 135 ($M=100$, $SD=15$).

Child maltreatment was assessed at age 5 separately for each twin by interviewing mothers with the standardised clinical interview protocol from the Multi-Site Child Development Project (Dodge, et al., 1990; Jaffee, et al., 2004), as described in chapter

4. On the basis of the mother's report of the severity of discipline and the interviewer's rating of the likelihood that the child had been maltreated, children were coded as having 'not been' (0), 'possibly been' (1), or 'definitely been maltreated' (2). In this study sub-sample, 5% ($N = 4$) had experienced probable or definite child maltreatment by the age of 5 years.

Maternal warmth was assessed at age 5 using Maternal Expressed Emotion (EE) scales, based on the Five Minute Speech sample (FMSS) method (Caspi, et al., 2004; Magana, et al., 1986), as described in chapter 4. Scores ranged from 0 to 5 ($M = 3.30$, $SD = 1.00$), where a score of (0) represented 'no warmth' and (5) represented 'high warmth'. In the present sub-sample, scores for maternal warmth ranged from 1 to 5 ($M = 3.34$, $SD = 1.12$).

We assessed *maternal negativity* at age 5 using procedures adapted from the Five Minute Speech Sample method (Caspi, et al., 2004; Magana, et al., 1986). Mothers were asked to speak for 5 minutes about each of their children. Audio recordings of the mothers' speech were coded by two trained raters according to guidelines adapted from the FMSS scoring manual and modified for use with preschool children. The raters underwent 2 weeks of training about coding expressed emotion. Inter-rater reliability was established by having the raters individually code audiotapes describing 40 children. The same rater coded both twins in the same family. The rater was blind to all other Study data.

Maternal negativity is a global measure of the whole speech sample and was assessed using a 6-point scale measuring the negativism expressed in the interview by the mother about her child. 'No negativity' (0), was coded when the mother made no negative comments about the child. 'A little negativity' (1), was coded when the mother made one minor criticism such as, 'she is lazy'. 'Some negativity' (2), was coded when the mother made two criticisms which were stronger in tone than the former rating. The next three codes were considered present when maternal negativity was generalised to the child himself/herself rather than against particular behaviours or attributes. These ratings were used when the tone and content of the interview were primarily negative. 'Negative - some dissatisfaction' (3), was coded when the mother repeatedly mentioned one or two particular traits of the child whom she did not like and wished to change; for example, 'she is not very clever, it would help if she tried more, but she doesn't, I wish she would try more, like her sister'. This was the general theme of this particular EE

interview with the mother, and was thus rated a 3. *'Negative - makes disparaging remarks and finds fault with the child'* (4), was coded when the mother had very little good to say about her child, and found fault in almost everything he/she did; for example, 'She always does it, I have never met such a clumsy child, we think 'oh here we go again, she's done it again,' it drives me mad, why doesn't she look where she is going, I'm constantly having to look out for her, she's constantly breaking things...sometimes I think she is stupid, she never learns.' *'Resentful and hostile'* (5), was coded when the mother gave the impression that she actively disliked the child. The interview would take the form of a stream of negativity against the child, with no positive comments; for example, 'I wish I had never had her...she's a cow, I hate her'. The inter-rater agreement rate was $r = .84$. Scores for negativity ranged from 0 to 4 ($M=1.67$, $SD=1.01$) in the present sub-sample.

We assessed *emotional and behavioural problems* when children were age 5 using the Child Behaviour Checklist for mothers (Achenbach, 1991a) and the Teacher's Report Form for teachers (Achenbach, 1991b), as used for the age 12 assessment. In this study sub-sample, combined mother and teacher scores for emotional problems at age 5 ranged from 0 to 40 ($M=10.85$, $SD=7.94$). For behavioural problems, scores ranged from 1 to 84 ($M=19.97$, $SD=15.42$).

Statistical analyses

Firstly, we contrasted bullied ($N = 44$) and non-bullied ($N = 44$) MZ twins on their attributional styles. We used linear regression models to determine whether being a victim of bullying was associated with the use of negative attributional styles in interpreting the cause of negative and positive events. We tested if the associations differed by gender by including an interaction term (gender x victimisation) in to the regression models. Results indicated non-significant interaction effects for all 3 attributional styles used for interpreting negative and positive events. Therefore, all analyses were conducted collapsed across gender. Secondly, we used linear regression models to test if bullied and non-bullied MZ twins differed on other child specific factors assessed at age 5, which could otherwise explain differences in attributional styles between bullied and non-bullied twins. Thirdly, we tested whether negative attributional styles were associated with children's emotional and behavioural problems using linear regression analyses. For these analyses, we used the 88 twins as one whole group of children without testing for contrasts between twins. Participants in this

sample were twins growing up in the same family, which resulted in non-independent observations. To account for the non-independence of the data, analyses were adjusted for with tests based on the sandwich or Huber/White variance estimator (Williams, 2000). All skewed data were normalised using square root transformation.

5.4 Results

Do bullied twins differ from their non-bullied co-twins on their attributional style?

Compared to their non-bullied co-twins, bullied twins reported the causes of negative events as being altogether more internal, global and stable ($\beta = 0.431$, $p=0.044$) (Table 6). Bullied twins did not differ from their non-bullied twins separately on any of the three subscales although there was a statistical trend for bullied children to attribute causes of negative events as being more generalisable across situations and stable across time compared to their non-bullied co-twins. When interpreting the causes of positive events, bullied and non-bullied twins did not significantly differ in their overall attributional style ($\beta = -0.128$, $p=0.467$), or individually on any of the subscales (Table 6).

Table 6: Associations between being bullied and attributional styles

	Non-bullied (N = 44)	Bullied (N = 44)	
	Mean (SD)	Mean (SD)	β (95% CI)
Negative events			
Total score	1.955 (1.524)	2.613 (1.528)	0.431 (0.011, 0.862)*
Internal	0.659 (0.805)	0.818 (0.657)	0.205 (-0.204, 0.614)
Global	0.364 (0.613)	0.568 (0.789)	0.139 (-0.019, 0.296)
Stable	0.932 (0.846)	1.227 (0.937)	0.335 (-0.081, 0.751)
Positive events			
Total score	7.409 (1.933)	7.182 (1.728)	-0.128 (-0.483, 0.226)
Internal	2.568 (1.108)	2.522 (1.089)	-0.043 (-0.401, 0.315)
Global	2.318 (0.909)	2.159 (1.033)	-0.183 (-0.673, 0.306)
Stable	3.023 (0.927)	2.932 (0.925)	-0.097 (-0.479, 0.284)

Note: SD= standard deviation. β = standardised beta coefficient, CI= confidence intervals. Analyses adjusted for gender. * = $p \leq 0.05$ ** = $p < 0.01$

The discordant MZ twin design rules out the possibility that the difference observed in the interpretation of negative events between bullied twins and their non-bullied co-twins could be explained by genetic or environmental factors shared by the twins.

However, it is possible that the attributional styles of bullied twins are explained by other factors specific to each twin in a pair. To establish that the differences in attributional styles observed between bullied and non-bullied twins could not be accounted for by any other child specific factors, we examined if bullied and non-bullied twins differed on a number of age 5 child-specific factors, pre-existent to their experiences of bullying victimisation. Results of regression analyses showed that bullied and non-bullied twins did not significantly differ on IQ, emotional and behavioural problems, levels of maternal warmth and negativity, and exposure to child maltreatment (Table 7). These findings indicate that the difference in attributional styles observed between bullied and non-bullied MZ twins cannot be explained by any of these factors. Further reinforcing this, analyses showed that the associations between attributional styles and bullying victimisation remained significant even after controlling for all covariates in a single model (Table 8).

Table 7: Mean differences between bullied and non-bullied twins on child specific factors

	Non-bullied (N=44)	Bullied (N=44)	
	Mean (SD) or %	Mean (SD) or %	β (95% CI)/ Chi ² (p value)
<i>Age 5 factors</i>			
IQ	101.391 (15.284)	99.224 (13.960)	-2.167 (-5.543, 1.209)
Emotional problems	10.189 (8.252)	11.515 (7.658)	0.202 (-0.109, 0.512)
Behavioural problems	19.688 (16.292)	20.243 (14.681)	0.049 (-0.184, 0.283)
Maternal warmth	3.350 (1.231)	3.325 (1.023)	-0.023 (-0.290, 0.243)
Maternal negativity	1.537 (1.027)	1.800 (0.992)	-0.026 (-0.318, 0.266)
Child Maltreatment (%)	2.270	6.820	1.047 (0.306)

Note: SD= standard deviation. β = standardised beta coefficient, CI= confidence intervals. Analyses adjusted for gender.

Table 8: Associations between being bullied and attributional styles after controlling for confounders at age 5

	Negative events β (95% CI)	Positive events β (95% CI)
Total score	0.367 (0.020, 0.714)*	-0.102 (-0.481, 0.276)
Internal	0.292 (-0.141, 0.725)	0.063 (-0.357, 0.483)
Global	0.242 (-0.107, 0.591)	-0.248 (-0.778, 0.281)
Stable	0.286 (-0.193, 0.764)	-0.119 (-0.536, 0.297)

Note: β = standardised beta coefficient, CI= confidence intervals. Analyses adjusted for gender, IQ, emotional and behavioural problems, maternal warmth, maternal negativity and child maltreatment. * = $p \leq 0.05$ ** = $p < 0.01$

Is negative attributional style associated with emotional and behavioural problems?

We tested whether negative attributional styles used for interpreting negative events were associated with emotional and behavioural problems. Results indicated that attributing the cause of negative events as being internal, global and stable was associated with children's behavioural problems and was marginally associated with emotional problems (Table 9). Specifically, there was a trend for viewing the cause of negative events as being stable over time to be associated with increased levels of children's behavioural problems. Similarly results also showed a trend for emotional problems to be associated with a stable account of causes of negative events. To ensure that these associations were not accounted for by pre-existing adjustment problems, we further controlled for pre-existing emotional and behavioural problems (Table 9). Adjusted analyses showed a decrease in the trend for stable attributional style being associated with behavioural and emotional problems. Furthermore, viewing negative events as being global (i.e. due to factors generalisable across situations) was specifically associated with higher levels of behavioural problems when pre-existing behaviour problems were taken into account. The association of collectively viewing negative events as being internal, global and stable, with emotional problems at age 12, was reduced by 32% (although it remained marginally significant). The association with behavioural problems was reduced by 9% and remained statistically significant.

Table 9: Association between negative attributional styles and children's adjustment problems with and without controlling for pre-existing adjustment problems

Age 12 Adjustment problems				
	Emotional problems β (95% CI)	p =	Behavioural problems β (95% CI)	p =
Negative events				
Total score	0.212 (-0.056, 0.481)	0.118	0.215 (0.013, 0.418)	0.038
Internal	0.001 (-0.235, 0.236)	0.997	0.137 (-0.124, 0.399)	0.296
Global	0.354 (-0.282, 0.990)	0.268	0.179 (-0.188, 0.546)	0.330
Stable	0.243 (-0.031, 0.517)	0.081	0.214 (-0.031, 0.459)	0.086
Negative events				
<i>Controlling for pre-existing emotional and behavioural problems</i>				
Total score	0.153 (-0.062, 0.368)	0.158	0.202 (0.062, 0.342)	0.006
Internal	0.013 (-0.199, 0.225)	0.904	0.154 (-0.057, 0.365)	0.149
Global	0.265 (-0.237, 0.766)	0.293	0.273 (0.016, 0.545)	0.049
Stable	0.159 (-0.074, 0.393)	0.176	0.136 (-0.037, 0.309)	0.121

Note: β = standardised beta coefficient, CI= confidence intervals. Analyses adjusted for gender.

5.5 Discussion

There are two main findings from this study. First, twins who were bullied in childhood reported higher levels of negative attributional styles in comparison to their non-bullied co-twin. Secondly, children with negative attributional styles had higher levels of adjustment problems, particularly behavioural problems. Having negative attributional styles thus appears to be a common component amongst children who are bullied and those who have adjustment problems, and could be targeted in future interventions focusing on children's well being. In particular supporting bullied children with cognitive based techniques may not only help in forming healthy attributional styles, but may also reduce the associated risk of developing adjustment problems.

Bullying and children's attributional styles

Consistent with other studies, our findings support an association between bullying and negative attributional styles, whereby bullied children interpreted the cause of negative events as being due to reasons related to themselves (internal), general across situations (global) and consistent over time (stable) (Gibb et al., 2004; Mezulis et al., 2006). Moreover, our findings extend those of previous studies by providing support for a causal association between being bullied and having negative attributional styles. A

strength of our study was the discordant MZ twin design, which allowed for the control of a wide range of confounders including genetic and familial factors (i.e. SES, parental education). Furthermore, it allowed us to take into account child specific factors (i.e. adjustment problems, maternal warmth), which have otherwise been associated with both bullying and the development of attributional styles. By using the discordant MZ twin design, we were not only able to draw inferences about causality but also gain some understanding about the aetiology of attributional styles. Primarily, 60% of the variance in attributional styles has been reported to be explained by non-shared environmental factors, with the remaining 35% of variance explained by genetic factors and 5% by shared environmental factors (Lau, Rijdsdijk, & Eley, 2006). Our results provide additional evidence for the importance of a specific non-shared environmental factor -- bullying victimisation -- that contributes to the development of negative attributional styles. Future research would benefit from investigating other non-shared environmental factors, such as intimate relationships or traumatic experiences, as potential risk factors for the development of negative attributional styles.

Children who were bullied used negative attributional styles when explaining the causes of negative events but not of positive events. Due to the detrimental effect negative events can have, children may be more motivated to seek explanations for the occurrence of negative events as opposed to those of a more positive nature. Furthermore, it may be possible that negative attributional styles need to be firmly established prior to influencing the interpretation of positive events. As attributional styles become more ingrained and rigid with age (Crick & Dodge, 1994), it is possible that as children get older their negative attributional styles will also influence their understanding of positive events. Our findings may be of particular interest to those involved with children's welfare as they demonstrate attributional styles as a potential developmental mechanism that is associated with the experience of being bullied. Although our discordant MZ twin design has allowed us to infer a causal association, the concurrent nature of our measures restricts us from being able to draw any conclusions about the direction of this association. By employing a longitudinal design, future research will be able to clarify this. Furthermore, as prior experiences of bullying victimisation at age 7 and 10 were used to help define discordance of bullying victimisation at age 12 between twin pairs, it is difficult to ascertain whether the association between cognitive attribution styles and victimisation at age 12 is not being influenced by earlier experiences of bullying victimisation. If the latter were the case

this would help reinforce the hypothesis that the negative experience of bullying victimisation shapes children's negative attribution biases. However, we could not control for early experiences of bullying victimisation in this study and inferences of causality are not possible.

The role of attributional styles in children's adjustment problems

Having established an association between being bullied and having a negative attributional style, one is naturally led to question what this means for the well being of bullied children. In keeping with previous studies our findings showed that children who used negative attributional styles to explain the occurrence of negative events had higher levels of behavioural problems (Hankin & Abramson, 2002; Rowe et al., 2006; Weiss et al., 1998). Specifically, our finding that children who attributed the cause of negative events as being global (i.e. due to factors generalisable across situations) reported higher levels of behavioural problems over and above the effects of pre-existing behavioural problems, coincides with the notion that negative global attributional styles may lead to elevated levels of frustration, which are acted out and manifested through behavioural problems (Toth et al., 2002). Furthermore, we observed marginal associations between emotional problems and negative attributional styles. Findings of negative attributional styles being associated with depression are less consistent amongst children in comparison to adolescents (Jacobs et al., 2008). This possibly suggests a developmental effect whereby the association between emotional problems and negative attributional styles will develop with age in our sample. Moreover, it has been suggested that attributional styles must be well established and stable to cause depressive symptoms (Turner & Cole, 1994). It is possible that at age 12 attributional styles are not quite stable enough to influence children's emotional problems and that symptoms will manifest over the forthcoming years. As associations with behavioural and emotional problems remained over and above pre-existing problems, these findings suggest that attribution style biases are associated with a change in behavioural and emotional problems that are not solely contributing towards children's risk of being bully victimised in the first place.

The mechanisms by which being bullied translates into an increased risk of developing adjustment problems is of growing interest. There is some evidence to suggest that cognitive styles may act as such a mechanism (Gibb et al., 2004; Mezulis et al., 2006)). Exposure to adverse life events (i.e. bullying) may lead children to develop a propensity

toward attributing the causes of events in a negative manner (i.e. blaming oneself for the occurrence of a negative event), which in turn may lead to feelings of hopelessness and manifest into symptoms of depression (Rose & Abramson, 1992). Our findings of bullying victimisation being associated with negative attributional styles, and negative attributional styles being associated with adjustment problems, provide some support for this notion. Due to the rigorous criteria applied to obtain the discordant MZ twin design, our sample of 44 discordant MZ twin pairs was possibly underpowered to detect whether negative attributional styles mediate, or act as a path through which being bullied translates into an increased risk of developing adjustment problems (Baron & Kenny, 1986). Replication of our findings with larger samples will help to address this issue and provide evidence in support of attributional styles being an important mechanism for the development of adjustment problems amongst bullied children.

Implications

It has been suggested that children's cognitive styles develop early in life and become more ingrained, automatic, and rigid as they age (Crick & Dodge, 1994). Children who demonstrate negative attributional styles continue on a trajectory to more negative attributional styles over time (Garber et al., 2002). However, there is emerging evidence to suggest that attributional styles can be malleable in young adults (Peters & Constans, 2011) and altered to promote positive mental health. Individuals with negative attributional styles will not only benefit from being identified in early childhood but also in late adolescence and early adulthood. Our findings further support the importance of developmental mechanisms such as cognitive processing amongst bullied children. The identification of such mechanisms will not only enhance our knowledge of how being bullied affects children's development but may also help in understanding how being bullied translates into an increased risk of adjustment problems. Identifying children who have been bullied and providing them with cognitive based techniques to aid their understanding of challenging environments may help to improve the way in which they attribute the cause of events and reduce their vulnerability for developing adjustment problems. For example, there is some evidence to suggest that cognitive bias modification (CBM) techniques have been effective in altering interpretive processes used for understanding the occurrence of events (Peters & Constans, 2011). These techniques include training scenarios of everyday positive and negative situations that promote self worthy and stable attributions for positive events and unstable attributions unrelated to self-worth for negative events. Undergoing such training has been

associated with lower levels of depressive feelings and the use of less self-deficient and stable attributions for the occurrence of negative events (Peters & Constans, 2011). Such techniques could therefore be useful tools for intervention strategies tackling the adverse effects of bullying.

6 Bullies and children with antisocial behaviours: Two peas in a pod

6.1 Abstract

Background: It is not clear whether bullies are different from other children with antisocial behaviours. It could be that bullies have similar antecedents and outcomes compared to children who show other antisocial behaviours. However, it is also possible that studying bullies, as a specific group of children, is informative beyond what we know already about children with antisocial behaviours generally. The present study investigated whether bullies and children with antisocial behaviours are similar on cognitive, temperament and family factors. **Method:** We used data from two longitudinal cohorts, the Environmental-Risk (E-Risk) Longitudinal Twin Study, a nationally representative sample of 2,232 children born between 1994 and 1995 and the Dunedin Multidisciplinary Health and Development Study, a longitudinal birth cohort of 1,037 children born between 1972 and 1973 in Dunedin, New Zealand. Using mothers' and teachers' reports of bullying perpetration and antisocial behaviours between ages 7-11, we identified four groups of children: bullies, children with high levels of antisocial behaviours, children with moderate levels of antisocial behaviours, and children who do not bully others and have no/low levels of antisocial behaviours. Measures of cognitive functioning, temperament, and family factors were collected prospectively during early childhood in both cohorts. Children's later adjustment problems were measured in early adolescence in the E-Risk Study and in adulthood in the Dunedin Study. **Results:** Bullies and children with antisocial behaviours had poorer cognitive functioning, had more undercontrolled temperament, and grew up in a negative family environment in childhood. Bullies did not significantly differ in their early risk factors from children with high antisocial behaviours but did from children with moderate antisocial behaviours. Being a bully or having antisocial behaviours was a significant predictor of later adjustment problems in early adolescence and adulthood. Being a bully had an independent effect on children's substance use in adolescence and emotional problems in later adulthood over and above the risk posed by having antisocial behaviours. **Conclusions:** Bullies and children with high antisocial behaviours have similar antecedents and later adjustment problems. For researchers, identifying bullies in early childhood may be a cost effective way of identifying children with severe antisocial behaviours.

6.2 Introduction

Recent years have witnessed a shift in opinion and it no longer remains disputable that bullying is a prevalent and important problem for schools globally (Craig, et al., 2009). Bullying research has not only seen considerable attention being given to the victims of bullying but also to the bullies themselves. As a highly vulnerable group who are at an increased risk of experiencing greater difficulties in later life (Farrington & Ttofi, 2011), it is not only important to identify bullies as a means of protecting the victims but also to help the bullies themselves.

Empirical findings from chapters 4 and 5 have shown that cognitive processes contribute towards the differential profiles children adopt in their bullying behaviours and later adjustment. However, as described earlier in this thesis, cognitive skills also play a key role in children's negative behaviours. They may thus not only contribute towards children's bullying perpetration but also be an informative tool in differentiating bullying 'profiles' from other negative behaviours.

Researchers have given considerable attention to the study of bullies as a distinct group of children with antisocial behaviours. Studies have identified antecedents and correlates of bullying behaviours with the aim of informing and developing interventions designed to prevent bullying. However, it is not clear whether bullies are different from other children with antisocial behaviours. It is possible that due to the specificity of bullying behaviours being repetitive over time, involving peers and an imbalance of power, studying bullies as a specific group of children is informative beyond what we already know about children with antisocial behaviours generally. However, bullying behaviours have been included as a diagnostic criterion for the DSM-IV diagnostic of conduct disorder (American Psychiatric Association, 1994), suggesting an overlap in the types of behaviours. Moreover, as peers constitute an important group of people children interact with as they start going to school, it may be that bullying behaviours are early manifestations of antisocial behaviours. Rather than being two distinct groups, it could therefore be that bullies are similar to children who show other antisocial behaviours. If empirical evidence supports this assumption, bullying researchers may benefit from harnessing the substantial body of information that is present about antisocial behaviours in childhood more generally and use it to inform bullying intervention efforts. With this in mind, the aim of this study was to

investigate the similarities between bullies and children with antisocial behaviours who do not bully others.

Further to sharing commonality in their characterisation of intention to cause harm, both bullying and antisocial behaviours share manifestations and have similar antecedents. Cognitive functioning has been identified as an influential factor affecting children's bullying and antisocial behaviours (Farrington & Baldry, 2010; Moffitt, 2007).

Cognitive skills are important for processing information from the environment, underpinning social interactions and influencing children's later behaviours (Koenen, Caspi, Moffitt, Rijdsdijk, & Taylor, 2006; Moffitt, Caspi, Harrington, & Milne, 2002; Simonoff et al., 2004). Thus having cognitive deficits such as poor self-regulation of actions and emotions is more likely to result in distorted perceptions of the environment and increased perceptions of threat, or frustration, predisposing children to behave negatively such as engaging in antisocial behaviours (Crick & Dodge, 1996; Dodge, 1980; Dodge, et al., 1990). Empirical evidence has shown that in childhood, bullies have poorer IQ, lower non-verbal intelligence (Farrington & Baldry, 2010) and poorer executive functioning, such as problems in decision-making and organisation (Coolidge, et al., 2004), when compared to non-bullies. Using data collected from the Cambridge Study in Delinquent Development, a study showed that 26% of boys who scored 90 and below on IQ tests at age 8-10 became bullies at age 14, in comparison to 15% of boys who scored higher than 90 on IQ tests (Farrington & Baldry, 2010).

Similarly, it has been established that children who display cognitive deficits such as low IQ, difficulties in reading, poor memory, and verbal and spatial impairments in early childhood, are also significantly more vulnerable for engaging in antisocial behaviours in later life (Moffitt, et al., 2002; Raine et al., 2005). Longitudinal studies have found that low IQ in childhood is a significant predictor of later involvement in conduct disorder, antisocial behaviour and delinquency over and above the effects of other contributory factors such as parental IQ and SES (Farrington, 1990; Fergusson et al., 2005b; Goodman et al., 1995; Murray et al., 2010).

There is also evidence suggesting that children's temperament contributes towards their involvement in bullying and antisocial behaviours. Children's lack of control such as being overly emotional or finding it difficult to control one's temper, may evoke negative peer interactions or place children in negative contexts, consequently

predisposing them to behave in an aggressive manner and engage in bullying or antisocial behaviours. Using measures that are underlined by an element of a lack of control, studies have found that compared to non-bullies, bullies are more active, emotional (Pellegrini, Bartini, & Brooks, 1999) and more temperamental (measured by items such as difficult to control temper, low tolerance to pressure) (Georgiou & Stavrinides, 2008). Similarly, studies have shown that children with antisocial behaviours in childhood are more likely to have a difficult temperament and exhibit behaviours that could represent a lack of control (Moffitt & Caspi, 2001) and have a low tolerance to frustrations (Veenstra, Lindenberg, Oldehinkel, De Winter, & Ormel, 2006).

Another influential factor placing children at an increased risk for bullying and antisocial behaviours is the home environment. Studies have found that bullies are more likely to belong to a socio-economically deprived home environments (Bowes et al., 2009; Jansen et al., 2011), have a convicted parent (Farrington & Baldry, 2010) and have parents who tend to be violent towards one another and towards them (Bowers et al., 1994). Similarly children with antisocial behaviours are more likely to come from socio-economically deprived home environments that are chaotic, receive harsh parenting and have antisocial parents (Moffitt, 2007; Smith & Farrington, 2004). A recent longitudinal study showed that family factors before the age of 5 such as parental loss, maternal depression, single parenting and teenage motherhood, all significantly increased children's risk of having conduct problems at age 10 (Murray et al., 2010). Furthermore, researchers observed a cumulative effect whereby children who were exposed to more risk factors in early childhood were more likely to develop conduct problems in later childhood. In the present study, we investigated cognition, child temperament and family factors in order to assess the similarities between bullies and children with antisocial behaviours.

Not only do bullies and children with antisocial behaviour share common antecedents but they also experience similar difficulties in later life. It is widely documented that being involved in bullying perpetration has serious implications for short and long term adjustment. Children who bully others have increased levels of peer rejection and dislike (Scholte et al., 2007), elevated levels of emotional and behavioural problems (Nansel et al., 2001), and delinquency (Barker et al., 2008a). The detrimental effects of being a bully are not limited to childhood and adolescence but also further extend to

difficulties in adulthood. Studies have found children who were bullies experienced elevated levels of depression and anxiety in early adulthood (Sourander et al., 2007), self-harm and suicidal thoughts (Klomek et al., 2009) and psychotic symptoms (Kelleher, et al., 2008). Being a bully also predicts a number of violent and negative behaviours. A recent study showed that men who frequently bullied others in childhood were 3.82 times more likely to be the perpetrators of intimate partner violence (Falb et al., 2011). Being a bully also predicts violent convictions, drug use, relationship and employment problems in adulthood (Farrington & Ttofi, 2011). These risks remained over and above other childhood risk factors such as parental convictions, and social deprivation that may otherwise contribute towards negative outcomes in adulthood. Bullying behaviours are thus early markers for negative outcomes, more specifically antisocial behaviours in later life. Based on the argument that bullying behaviours are a manifestation of antisocial behaviours, the continuation of bullies engaging in other antisocial behaviours as adults, could indicate the stability of antisocial behaviours from early childhood to adulthood (Loeber, 1982).

Similarly there is a robust association between antisocial behaviours in early life and later negative outcomes (Moffitt et al., 2002). A number of longitudinal studies have found that youth involved in antisocial behaviours go on to experience elevated levels of anxiety, depression, substance abuse, difficulties establishing positive relationships and financial difficulties (Colman et al., 2009; Farrington, Ttofi, & Coid, 2009; Fergusson, Horwood, & Ridder, 2005a). In a study previously published by our research team using data from the Dunedin Study, men and women who engaged in antisocial behaviours in childhood and continued to do so into early adulthood, had poorer mental and physical health, engaged in more violent behaviours, and had more economic problems at age 32 in comparison to low antisocial cohort norm group (Odgers et al., 2008). Thus, similar to the findings on bullies, there is ample evidence to support the observation that children who engage in antisocial behaviours in childhood are more likely to continue to develop further difficulties in later life. Children who therefore show signs of antisocial behaviours or bullying in early childhood are a highly vulnerable group. We investigated negative outcomes associated with being a bully and having antisocial behaviours in early adolescence and later adulthood.

Being a bully or engaging in antisocial behaviours not only has a detrimental effect on an individual level through adjustment problems such as elevated levels of emotional

and behavioural problems (Farrington & Ttofi, 2011; Moffitt et al., 2002), but also impacts society as a whole by placing a strain on current resources such as the medical and judicial services. So much so that children who engaged in persistent antisocial behaviours have been found to cost society 10 times as much as controls as adults (Scott, Knapp, Henderson, & Maughan, 2001). It is therefore not only important to identify vulnerable individuals to help assist in their positive adjustment but also to help ease pressure on societal resources. Using data collected from multiple informants in two longitudinal birth cohorts of children born in the United Kingdom and in New Zealand, the present study aimed to investigate whether bullies and children with antisocial behaviours are similar on their early antecedents and later adjustment problems. We furthered our investigation by examining if being a bully contributed, independently of other antisocial behaviours, to children's later adjustment problems.

6.3 Methods

Sample

Participants were members of the *Environmental Risk (E-Risk) Longitudinal Twin Study* and the *Dunedin Multidisciplinary Health and Development Study*, as described in chapter 3.

Bullying and antisocial behaviours

Environmental Risk Longitudinal Twin Study

We assessed *bullying* and *antisocial behaviours* at age 7 and 10 using items from the Child Behaviour Checklist (Achenbach, 1991a) and Teacher's Report Form (Achenbach, 1991b). Mothers and teachers were asked to rate each item as being 'not true' (0), 'somewhat or sometimes true' (1), or 'very or often true' (2). The reporting period was 6 months prior to the interview. *Bullying* was measured using mothers' reports for the item 'bullying or threatening people', and teachers' report for the item 'cruelty, bullying, or meanness to others'. We combined mothers' and teachers' reports of bullying perpetration. A child was considered a 'bully' if he or she had been reported to bully others somewhat or sometimes (score of 1) by at least one informant at both ages or by both informants at either 7 or 10 years. This categorisation captured stable, pervasive and frequent bullying behaviours while preserving the statistical power to conduct analyses on a group of vulnerable children. This resulted in 393 children (18%) being identified as bullies and the remaining 1,807 (82%) to represent non-bullies. The *antisocial behaviours* scale is the sum of items from the Delinquent Behaviour (e.g.

‘lying or cheating’) and Aggressive Behaviour scales (e.g. ‘temper tantrums or hot temper’) minus the item measuring bullying behaviours (as detailed above). These scales were supplemented with DSM–IV items assessing conduct and oppositional defiant disorder (e.g., ‘spiteful, tries to get revenge’), and items from the Rutter Questionnaire (e.g. ‘cruel to animals’). Mothers reported on 41 items and teachers reported on 40 items assessing children’s antisocial behaviour at age 7 and 10. These were averaged to create a composite antisocial behaviour score and ranged from 0 to 170 ($M=18.82$, $SD=15.00$). The continuous scale of antisocial behaviours was further categorised into three groups for examining groups of children according to the severity of antisocial behaviours. The bottom tertile of the distribution represented ‘no/low antisocial’ (34%, $N=735$), the middle tertile represented ‘moderate antisocial’ (33%, $N=733$); and the top tertile represented ‘high antisocial’ (33%, $N=732$).

Contingency tables for bullying versus antisocial behaviours showed the majority of bullies ($N=332$) reported high levels of antisocial behaviours (Table 10) and very few reported ‘no/low antisocial behaviours ($N=2$). These observations helped inform the creation of groups of children involved in bullying and antisocial behaviours within the E-Risk cohort.

Four groups of children were created based on bullying and antisocial behaviours at age 7 and 10 (Table 11): (1) control children, who are not bullies and have no/low other antisocial behaviours (33%, $N=733$); (2) bullies, are children who bully others (this included children with antisocial behaviours as the majority of children who are bullies also engaged in other types of antisocial behaviours (18%, $N=393$); (3) moderate antisocial children, are children who have moderate antisocial behaviours (as described above) but do not bully others (31%, $N=673$); and (4) high antisocial children, are children with high levels of antisocial behaviours and do not bully others (18%, $N=401$).

Dunedin Multidisciplinary Health and Development Study

We assessed *bullying* and *antisocial behaviours* at age 7, and 11 using mother and teacher reports of items from the Rutter Child Questionnaire (Rutter, et al., 1970). Both informants rated the items as being ‘not true’ (0), ‘somewhat or sometimes true’ (1), or ‘very or often true’ (2). The reporting period was 6 months prior to the interview.

Bullying was measured using the item ‘cruel or nasty to other people’. We combined

mothers' and teachers' reports of bullying perpetration to maximise the information reported by both informants. A child was considered a 'bully' if he or she had been reported to bully others somewhat or sometimes (score 1) by at least one informant at both ages or by both informants at either age 7 or 11. This resulted in 175 children (18%) being identified as bullies and the remaining 810 (82%) representing non-bullies. The *antisocial behaviour* score is the sum of mothers' and teachers' reports on 7 items each such as 'often destroys own or others' belongings' and 'is often disobedient', minus the item measuring bullying behaviours as detailed above. Mother and teacher reports of children's antisocial behaviours were averaged across the ages to create a composite antisocial behaviour score between ages 7 and 11. Scores ranged from 0 to 6.75 (M=1.26, SD=1.18). The continuous scale of antisocial behaviours was further categorised into three groups where approximately the bottom tertile of the distribution represented 'no/low antisocial' (36%, N= 353), the middle tertile represented 'moderate antisocial' (36%, N= 353); and the top tertile represented 'high antisocial' (28%, N= 279).

Contingency tables for bullying versus antisocial behaviours showed the majority of bullies (N=129) reported high levels of antisocial behaviours (Table 10) and very few reported 'no/low antisocial behaviours (N= 3). These observations helped inform the creation of groups of children involved in bullying and antisocial behaviours within the Dunedin cohort.

Table 10: Contingency tables showing the overlap between bullying and antisocial behaviours

Bullies	Antisocial groups		
	No/low antisocial % (N)	Moderate antisocial % (N)	High antisocial % (N)
Environmental Risk Longitudinal Twin Study: Age 7-10			
Non-Bullies	99 (733)	92 (673)	55 (401)
Bullies	1 (2)	8 (59)	45 (332)
Dunedin Multidisciplinary Health and Development Study: Age 7-11			
Non-Bullies	99 (349)	88 (311)	54 (150)
Bullies	1 (3)	12 (42)	46 (129)

Four groups of children were created based on bullying and antisocial behaviours at age 7-11 (Table 11); (1) control children, who are not bullies and have no/low other antisocial behaviours (35%, N=349); (2) bullies, are children who bully others (this included children with antisocial behaviours as the majority of children who are bullies also engaged in other types of antisocial behaviours (18%, N=175); (3) moderate antisocial children, who have moderate antisocial behaviours (as described above) but do not bully others (32%, N=311); and (4) high antisocial children, who have high levels of antisocial behaviours and do not bully others (15%, N=150). As shown in Table 11, the percentage of children in each of the 4 groups was similar in both the E-Risk and Dunedin study cohorts.

Table 11: Groups of children involved in bullying and antisocial behaviours

	Bullying and antisocial groups			
	Controls % (N)	Bullies % (N)	High antisocial % (N)	Moderate antisocial % (N)
Environmental Risk Longitudinal Twin Study: Age 7-10				
Total children	33 (733)	18 (393)	18 (401)	31 (673)
Boys	25 (268)	22 (241)	23 (247)	30 (320)
Girls	41 (465)	14 (152)	14 (154)	31 (353)
Dunedin Multidisciplinary Health and Development Study: Age 7-11				
Total children	35 (349)	18 (175)	15 (150)	32 (311)
Boys	30 (154)	19 (97)	19 (97)	32 (162)
Girls	41 (195)	16 (78)	11 (53)	32 (149)

Antecedents

Environmental Risk Longitudinal Twin Study: Age 5

Cognitive functioning

To assess children's *Intelligence Quotient (IQ)*, each child was individually tested at age 5 using a short form of the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R) (Wechsler, 1990), as described in chapter 4. Scores were standardised to a mean of 100 and a standard deviation of 15 and ranged from 55 to 151, where lower scores represented poorer IQ.

We assessed children's *theory of mind (ToM)* by administering a total of eight ToM tasks when children were 5 years old (Hughes, et al., 2005), as described in chapter 4.

Children's total scores ranged from 0 to 12 ($M=4.52$, $SD=3.28$) where lower scores represent poorer ToM.

We measured *executive functioning* at age 5 using a short form of the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R) (Wechsler, 1990) comprising the Mazes Task, the Day - Night Task and the Sentence Working Memory Tasks. Total scores for executive functioning were created by summing scores across each task that were transformed to create uniform scales ranging from 0-24. Scores ranged from 1.5 to 20 ($M=11.60$, $SD=3.09$) where lower scores represent poorer executive functioning.

Temperament

Children's *undercontrolled* temperament was measured at age 5 using interviewer ratings. Following the home visits, the interviewers rated children's style of approach and response to the testing session and to the home visit more generally using a behavioural checklist. Each behaviour was defined in explicit terms, and the interviewer was asked to evaluate whether each behaviour was (0) 'not at all', (1) 'somewhat', or (2) 'definitely' characteristic of the child (Caspi, Henry, McGee, Moffitt, & Silva, 1995). Summing across 9 items that included behaviours such as 'easily frustrated', 'hostility', 'restlessness', and 'impulsivity' created a composite score for undercontrolled temperament. Scores ranged from 0 to 18 ($M= 2.41$, $SD= 3.63$). Children scoring high on this measure were emotionally labile, impulsive, irritable, negativistic, rough, and had difficulty concentrating.

Family factors

Maternal warmth was assessed at age 5 using Maternal Expressed Emotion (EE) scales, based on the Five Minute Speech sample (FMSS) method (Caspi et al., 2004; Magana, et al., 1986), as described in chapter four. Scores ranged from 0 to 5 ($M= 3.3$, $SD= 1.00$), where a score of (0) represented 'no warmth' and (5) represented 'high warmth'. Scores were recoded to create an index of risk.

Domestic violence was assessed by inquiring about 12 acts of physical violence, including all 9 items from the Conflict Tactics Scale, Form R (Straus, 1990) in addition to 3 items describing other physically abusive behaviours (Jaffee, Moffitt, Caspi, Taylor, & Arseneault, 2002). The domestic violence measure represents the variety of

acts of violence mothers experienced as both victims and perpetrators. Mothers were asked about their own violence toward any partner and about partners' violence toward them during the 5 years since the twins' birth, responding (0) 'not true', (1) 'somewhat true' or (2) 'true'. Scores greater than '0' were coded to represent any experience of domestic violence 42% (N= 938).

Low *socioeconomic status* (SES) was measured at age 5 using a standardised composite of income, education, and social class (Trzesniewski et al., 2006). Low SES was defined as having an SES score in the lowest tertile of the SES distribution at age 5.

Child maltreatment was assessed at age 5 separately for each twin by interviewing mothers with the standardised clinical interview protocol from the Multi-Site Child Development Project (Dodge et al., 1990; Jaffee et al., 2004), as described in chapter 4. On the basis of the mother's report of the severity of discipline and the interviewer's rating of the likelihood that the child had been maltreated, children were coded as having 'not been' (0), 'possibly been' (1), or 'definitely been maltreated' (2). For the purposes of these analyses, scores greater than 0 were coded to represent any experience of child maltreatment (14% N= 307).

Confounder

Measures of children's *birth weight* were collected when families were first contacted. Information was obtained for 2,076 children (93% of the sample). Birth weight for the sample ranged from 0.45 to 4.11 kg (M= 2.44, SD= 0.54).

Dunedin Multidisciplinary Health and Development Study: Age 3-13

Cognitive functioning

Intelligence (IQ) was assessed from age 7 to 13 years, using the Wechsler Intelligence Scale for Children–Revised (WISC-R) (Wechsler, 1974). Psychometrists administered all tests according to standard protocol. Scores across the 5 age periods were averaged to enhance reliability and standardised to population mean = 100, SD=15, where lower scores represented poorer IQ (Moffitt, Caspi, Harkness, & Silva, 1993).

Temperament

Children's *undercontrolled temperament* was measured at age 3 and 5 using interviewer ratings. Children participated in a 90-min testing session of cognitive and motor tasks

administered by an examiner who had no knowledge of the child's prior behavioural history. Following the session, the interviewer rated the child's behaviour on a checklist, and based on factor analyses of these ratings a developmentally robust dimension reflecting individual differences in undercontrolled temperament was identified (Caspi, et al., 1995). Scores ranged from 0 to 9 (Mean=1.18, SD=1.65). Children scoring high on this factor were emotionally labile, impulsive, irritable, negativistic, rough, and had difficulty concentrating.

Family factors

We assessed *low maternal warmth* during children's age 3 assessments by asking a psychologist and doctor to separately rate mothers on their general attitude and behaviour in relation to their child. Mothers were rated on 8 features: harshness towards the child, critical or negative evaluation of the child, rough, awkward handling of the child, no effort to help child, unaware or unresponsive to child's needs, indifferent to child's performance, demanding of child's attention, soiled, unkempt appearance of the child. This assessment has been found to be reliable and valid in previous research (Henry, Moffitt, Robins, Earls, & Silva, 1993). Scores from the doctor and the psychologist were summed to create a measure of maternal warmth. Scores ranged from 0 to 9 (M=0.57, SD=1.31), where high scores represented low maternal warmth.

We assessed *family conflict* when children were 7 year using mothers' reports on the conflict subscale of the Moos Family Relations Index (Moos & Moos, 1981). The conflict subscale measured the amount of openly expressed anger, aggression, and conflict among family members and contained items such as 'family members sometimes hit each other'. Scores ranged from 0 to 9 (M = 3.42, SD = 1.99). Higher score indicated more exposure to family conflict.

Family socioeconomic status (SES) measured the average SES level of the study members' families across the first 15 years of the Dunedin Study using a 6-point scale assessing parents' occupational status. The scale places parental occupation into one of six categories based upon the educational levels and income associated with that occupation in data from the New Zealand census (Elley & Irving, 1976). The scale ranges from 1 = 'unskilled labourer' to 6 = 'professional' (M=3.75, SD=1.14). This measure reflects the socioeconomic conditions study members experienced whilst they

grew up and lower scores indicated lower SES. Low SES was defined as having an SES score in the lowest tertile of the SES distribution.

We measured *child maltreatment* from ages 3 to 11 years using parental reports, prospective behavioural observations, and retrospective reports by study members once they reached adulthood (Caspi et al., 2002). First, exposure to maternal rejection was assessed at age 3 years by observational ratings of mothers' interactions with the study children. Second, exposure to harsh discipline was assessed at ages 7 and 9 years according to parental reports of disciplinary behaviours. Parents scoring in the top decile of the sample wide distribution (10% of participants) were classified as unusually harsh for that time and culture. Third, exposure to disruptive caregiver changes was assessed through age 11 years and was defined by 2 or more changes in the child's primary caregiver. Fourth, exposure to physical abuse through age 11 years was assessed retrospectively at age 26 years on the basis of study members' reports of severe physical punishment resulting in lasting bruising or injury. Fifth, exposure to sexual abuse was assessed retrospectively at age 26 years on the basis of study members' reports of unwanted sexual contact through age 11 years. A cumulative exposure index was derived for each child by counting the number of maltreatment indicators during the first decade of life. This was further dichotomised to represent 'any exposure to child maltreatment'. A total of 36% of children was reported to have experienced any exposure to child maltreatment.

Confounder

Measures of participants' *birth weight* were obtained from hospital records. Children's birth weight ranged from 1.42 kg to 5.40 kg ($M=3.38$, $SD=0.52$).

Adjustment problems

Environmental Risk Longitudinal Twin Study: Age 12

We assessed emotional problems when children were 12 years using the Achenbach family of instrument (Achenbach, 1991a; Achenbach, 1991b). The emotional problems scale is the sum of 23 items from the CBCL and 27 items from the TRF on the Withdrawn and Anxious/Depressed scales, including items such as 'cries a lot', 'withdrawn, doesn't get involved with others', and 'worries' (Somatic Complaints were not included, as this scale was not assessed at age 12). Mothers' scores ranged from 0 to 34 ($M = 6.45$, $SD = 5.71$) and teachers' scores ranged from 0 to 43 ($M = 4.51$, $SD =$

5.50). The internal consistency reliability score for mothers was 0.87 and 0.89 for teachers. Mother and teacher reports were standardised and summed to create composite measures of emotional problems at 12 years. The total score for emotional problems ranged from 0 to 72 ($M = 10.98$, $SD = 8.30$).

We assessed aggressiveness when children were 12 years using mothers' and teachers' reports of the Achenbach family of instruments (Achenbach, 1991a; Achenbach, 1991b). The aggressive scale is the sum of 20 items from the CBCL and 25 items from the TRF including items such as 'argues a lot', and 'physically attacks people'. Mothers' scores ranged from 0 to 38 ($M = 8.30$, $SD = 6.91$), and teachers' scores ranged from 0 to 44 ($M = 4.51$, $SD = 7.74$). The internal consistency reliability score for mothers was 0.91 and 0.96 for teachers. Mother and teacher reports were standardised and summed to create a composite measure of aggressiveness at 12 years. Total score for aggressiveness ranged from 0 to 74.54 ($M = 12.85$, $SD = 11.42$).

Poor school performance at age 12 was measured using two items from the Achenbach Teacher Report Form (TRF). Teachers were asked to compare each twin's current school performance in Maths and English with typical pupils of the same age. They were asked to rate twin's performance on a scale of 0 to 4 ranging from 'far below average' to 'far above average'. Taking the mean scores of two items, we created a composite score for school performance, which ranged from 0 to 4 ($M=2.13$, $SD=0.89$). For the analyses scores were recoded to represent poor school performance.

Substance use at age 12 was measured by asking mothers to report on whether either twin 'uses drugs for non-medical purposes', 'drinks alcohol without parents approval' and 'smokes tobacco'. Mothers were asked to report on the past 6 months prior to the interview and rates each item as being 'not true' (0), 'somewhat or sometimes true' (1), or 'very true or often true' (2). Taking the mean scores of the three items created a composite score for substance use, which ranged from 0 to 2. This was further dichotomised to represent 'any substance use'. A total of 3% of the E-risk sample was reported to have engaged in some form of substance use by age 12.

Dunedin Multidisciplinary Health and Development Study: Age 32

We measured *emotional problems* at age 32 using informant reports on four depressive symptoms (e.g. 'feels that no one loves them', 'seems lonely', 'feels depressed,

miserable, sad, or unhappy' and 'talks about suicide') and three anxiety symptoms (e.g. 'has unreasonable fears or worries', 'worries a lot', and 'gets nervous easily'). Informant reports were obtained by mailing a brief questionnaire about problem behaviour and personality to three people nominated by each study member as people who know them well. These mostly included best friends, partners and other family members. Information was available for 96% of study members seen at age 32. Response options for depressive and anxiety symptom items were 'no does not apply' (0), 'yes applies somewhat' (1), and 'yes, certainly applies' (2) (Moffitt, et al., 2002). Total score for the four depressive symptoms ranged from 0 to 8 ($M=0.85$, $SD=1.17$) and the total score for the three anxiety symptoms ranged from 0 to 6 ($M=1.72$, $SD=1.19$). To create a measure of emotional problems, scores for the depressive and anxiety symptoms were averaged across informants and summed to create a composite measure of emotional problems. Prior to being summed scores were standardised to account for the unequal number of items across depressive and anxiety symptoms.

Convictions for violent offenses in all New Zealand and Australian courts were obtained by searching the central computer system of the New Zealand police. A total of 9% ($N=86$) of study members were convicted of violent offences during their lifetime at the point of their interview at age 32. Convictions included common assault, common domestic assault, assault of child, assault with a weapon, rape, indecent assault on female, robbery aggravated with a firearm, male assaults female with weapon, resisting police, and arson.

Not graduating from school was defined as ending secondary education prior to receiving qualifications, and not returning to earn qualifications by age 32. Qualifications are based on national exams that almost all students take by age 16, which determine promotion in secondary and technical schools. A total of 33% ($N=324$) participants in the Dunedin cohort did not graduate from secondary school.

We measured *substance problems* at age 32 by asking informants (as described above) to report on two items (e.g., 'has alcohol problems' and 'has marijuana or other drug problems') (Moffitt et al., 2002). Scores ranged from 0 to 2 and were dichotomised to represent 'any substance problems'. Amongst the Dunedin sample 25 % ($N=233$) were reported to have a substance problem at age 32.

Statistical analyses

First, we tested whether children's cognitive functioning, temperament and family factors were associated with children being bullies or having other antisocial behaviours. We used multinomial logistic regression analyses to (a) compare bullies and children with antisocial behaviours to control children who are not bullies or have no/low antisocial behaviours; and (b) compare children with antisocial behaviours to bullies as the comparison group. We tested whether the associations differed by gender by including interaction terms for the 3 domains of antecedents in the regression models. Results indicated non-significant effects, thus all analyses were conducted collapsed across gender. We further adjusted for gender and children's birth weight in all models as potential confounders.

Second, we tested whether being a bully or having antisocial behaviours in childhood was associated with maladjustment at age 12 and 32 using linear and logistic regression models. We further tested whether bullying had an independent effect on later maladjustment over and above the effect of other antisocial behaviours. For these analyses, we used continuous measures of bullying and antisocial behaviours in order to capture increased variability. Increased variability was important as analyses were performed with both bullying and antisocial behaviours in the same model to test for an independent effect. This increase of variance increased the power to detect small effects. We tested whether the associations differed by gender by including interaction terms for bullying and antisocial behaviours in the regression models. Results indicated non-significant effects thus all analyses were conducted collapsed across gender.

6.4 Results

Are bullies and children with antisocial behaviours similar on early childhood cognitive processing, temperament and family factors?

In the E-Risk sample, bullies and children with antisocial behaviours had poorer IQ and were more undercontrolled than children who did not bully or have antisocial behaviours (Table 12). Bullies had lower ToM compared to controls, but children with antisocial behaviours did not significantly differ from control children. Bullies and children with antisocial behaviours did not significantly differ in their executive functioning when compared to controls. In addition, bullies and children with antisocial behaviours were more likely to have received low maternal warmth during early childhood, experience early exposure to domestic violence, be maltreated by an adult

and grow up in a deprived socioeconomic environment. Bullies and children with high levels of antisocial behaviours were more likely to have experienced maltreatment in childhood when compared to controls but children with moderate levels of antisocial behaviours did not.

Bullies did not differ from children with high levels of antisocial behaviours on their early IQ, executive functioning, temperament and overall family factors (Table 12). However they had significantly lower levels of ToM and were less likely to have been exposed to domestic violence. Bullies had lower cognitive functioning, were more undercontrolled and belonged to a more risky family environment than children with moderate levels of antisocial behaviours.

Similarly, in the Dunedin sample, bullies and children with antisocial behaviours had poorer IQ, were more undercontrolled and were exposed to negative family environments in comparison to controls (Table 12). Bullies and children with antisocial behaviours did not significantly differ in the levels of warmth received by their mothers when compared to controls. Bullies and children with high antisocial behaviours did not significantly differ on their early antecedents. However, compared to children with moderate levels of antisocial behaviours, bullies had lower IQ, were more undercontrolled, grew up in a more deprived environment and experienced more child maltreatment. Bullies also showed a trend for experiencing more family conflict and did not receive as much warmth from their mothers.

Table 12: Group means, percentages and comparisons of early predictors for bullies and children with antisocial behaviours

	Group means and percentages				Comparison between groups				
	Controls	Bullies	High antisocial	Moderate antisocial	Compared to controls			Compared to bullies	
					Bullies	High antisocial	Moderate antisocial	High antisocial	Moderate antisocial
	M (SD) or % (N)	M (SD) or % (N)	M (SD) or % (N)	M (SD) or % (N)	OR	OR	OR	OR	OR
Environmental Risk Longitudinal Twin Study: Predictors at age 5									
<i>Cognitive functioning</i>									
IQ	102.964 (14.711)	94.342 (14.961)	98.556 (14.385)	101.142 (14.801)	0.967**	0.979**	0.991*	1.012	1.024**
Theory of mind	5.078 (3.296)	3.535 (2.960)	4.331 (3.215)	4.609 (3.345)	0.754**	0.911	0.919	1.207*	1.218*
Executive functioning	11.842 (2.854)	11.057 (3.128)	11.389 (3.278)	11.818 (3.157)	0.957	0.997	1.072	1.042	1.121
<i>Temperament</i>									
Undercontrolled	1.709 (3.038)	3.505 (4.293)	3.224 (4.155)	2.030 (3.186)	1.539**	1.437**	1.081	0.934	0.703**
<i>Family factors</i>									
Low maternal warmth	1.449 (0.924)	2.043 (1.025)	2.022 (0.983)	1.699 (0.969)	0.620**	0.589**	0.811*	0.949	1.308**
Domestic violence %	28.810 (210)	60.150 (234)	49.000 (196)	42.220 (282)	2.600**	1.735**	1.638*	0.666*	0.629*
Low SES %	21.830 (160)	48.350 (190)	40.900 (164)	31.800 (214)	2.578**	2.005**	1.444*	0.778	0.560**
Child maltreatment %	7.500 (55)	22.650 (89)	19.500 (78)	12.65 (85)	2.275**	1.941**	1.328	0.853	0.584*
Dunedin Multidisciplinary Health and Development Study: Predictors at age 3-13									
<i>Cognitive functioning</i>									
IQ	103.662 (14.136)	94.553 (16.384)	95.308 (13.217)	100.939 (14.429)	0.955**	0.958**	0.984**	1.003	1.030**
<i>Temperament</i>									
Undercontrolled	0.844 (1.287)	1.737 (2.142)	1.650 (1.938)	1.076 (1.439)	1.754**	1.702**	1.232*	0.970	0.702**
<i>Family factors</i>									
Low maternal warmth	0.402 (1.111)	0.857 (1.484)	0.840 (1.520)	0.516 (1.333)	1.040	0.998	0.953	0.960	0.917
Family conflict	2.975 (2.081)	3.772 (1.955)	4.109 (1.938)	3.403 (1.828)	1.496**	1.757**	1.242*	1.174	0.830
Low SES %	26.220 (91)	44.510 (77)	38.260 (57)	32.480 (101)	2.162**	1.533	1.368	0.709	0.633*
Child maltreatment %	23.280 (81)	52.000 (91)	54.000 (81)	35.370 (110)	2.961**	3.338**	1.770**	1.127	0.598*

Note: Multinomial logistic regression analyses adjusted for gender, birth weight and factors within each domain (i.e. cognitive functioning). M = means, SD = standard deviation, OR = odds ratio. * = $p \leq 0.05$ ** = $p < 0.01$

Are bullies and children with antisocial behaviours at risk of later adjustment problems?

In the E-Risk sample, bullies and children with antisocial behaviours had more emotional problems, were more aggressive, had poorer school performance and were more likely to use substances at age 12 compared to controls (Table 13). Children with moderate levels of antisocial behaviours had the lowest, although significant, levels of adjustment problems during early adolescence.

Similarly, in the Dunedin sample, bullies and children with antisocial behaviours during childhood had significantly more adjustment problems in later adulthood when compared to controls (Table 13). Bullies and children with high levels of antisocial behaviours had higher levels of emotional problems, and on average, had a four fold increased risk of being convicted for violent crimes, a three fold increased risk of not graduating from school and a two fold increased risk of having substance problems. Children with moderate levels of antisocial behaviours also had significantly more adjustment problems and showed a trend towards being at a greater risk of being convicted of violent crimes in adulthood when compared to controls.

Does bullying independently contribute to later adjustment problems over and above antisocial behaviours?

Univariate analyses showed that both bullying and other antisocial behaviours were significantly associated with adjustment problems in early adolescence amongst participants in the E-Risk Study (Table 14). Children who engaged in bullying and antisocial behaviours had elevated levels of emotional problems and aggressiveness, had lower school performance, and had started to use an increased number of substances in early adolescence. Multivariate analyses showed that over and above antisocial behaviours, engaging in bullying was associated with an increased risk of substance use at age 12 (OR= 3.718, CI= 1.478, 9.354). Bullying behaviours did not have an independent effect on children's emotional problems, aggressiveness and poor school performance at age 12, over and above the risk posed by antisocial behaviours.

Further analyses showed that bullying and other antisocial behaviours were also significantly associated with adjustment problems in adulthood amongst participants of the Dunedin Study (Table 14). Individuals who had participated in bullying or other antisocial behaviours during childhood had high levels of emotional problems at age 32,

they had more violent convictions, were more likely to have not graduated from school and they had more substance problems. Over and above antisocial behaviours, engaging in bullying was associated with decreased levels of emotional problems ($\beta = -0.371$, CI = -0.666, -0.077) at age 32. Bullying behaviours did not have an independent effect on violent convictions, graduating from school and substance problems over and above the risk posed by antisocial behaviours.

Table 13: Group means, percentages and comparisons of adjustment problems for bullies and children with antisocial behaviours

	Group means and percentages				Compared to controls		
	Controls	Bullies	High antisocial	Moderate antisocial	Bullies	High antisocial	Moderate antisocial
Environmental Risk Longitudinal Twin Study: Adjustment problems age 12							
	M (SD)	M (SD)	M (SD)	M (SD)	β (95%CI)	β (95%CI)	β (95%CI)
Emotional problems	8.413 (6.349)	14.857 (9.858)	13.393 (9.822)	10.062 (6.929)	0.799 (0.648, 0.949)**	0.623 (0.484, 0.762)**	0.209 (0.121, 0.298)**
Aggressiveness	5.145 (4.951)	23.280 (14.587)	18.829 (10.867)	11.546 (7.647)	1.535 (1.382, 1.688)**	1.143 (1.035, 1.251)**	0.535 (0.469, 0.602)**
Poor school performance	1.636 (0.836)	2.191 (0.9106)	2.091(0.906)	1.791 (0.844)	0.601 (0.441, 0.761)**	0.487 (0.327, 0.646)**	0.164 (0.036, 0.292)*
	% (N)	% (N)	% (N)	% (N)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Substance use %	0.570 (4)	8.560 (32)	2.060 (8)	1.670 (11)	17.480 (5.959, 51.278)**	3.929(1.097, 14.212)*	3.069 (1.097, 8.584)*
Dunedin Multidisciplinary Health and Development Study: Adjustment problems age 32							
	M (SD)	M (SD)	M (SD)	M (SD)	β (95%CI)	β (95%CI)	β (95%CI)
Emotional problems	2.038 (1.892)	2.491 (2.267)	2.934 (2.396)	2.363 (2.129)	0.282 (0.103, 0.460)**	0.485 (0.296, 0.675)**	0.151 (0.009, 0.301)*
	% (N)	% (N)	% (N)	% (N)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Violent convictions %	3.600 (12)	15.380 (26)	15.380 (22)	7.640 (23)	4.271 (2.063, 8.842)**	3.588 (1.698, 7.584)**	1.940 (0.937, 4.016)
Not graduating school %	22.730 (75)	44.170 (72)	50.000 (72)	31.540 (94)	2.637 (1.762, 3.948)**	3.267 (2.148, 4.969)**	1.538 (1.077, 2.196)*
Substance problems %	16.830 (53)	32.050 (50)	30.940 (43)	27.840 (81)	2.179 (1.384, 3.430)**	1.924 (1.198, 3.089)**	1.779 (1.197, 2.644)**

Note: Linear and logistic regression analyses adjusted for gender. M = means, SD = standard deviation, β = standardised beta coefficient, OR = odds ratio, CI = confidence intervals. * = $p \leq 0.05$ ** = $p < 0.01$

Table 14: Unique contribution of bullying to adjustment problems controlling for antisocial behaviours

Environmental Risk Longitudinal Twin Study				
	Adjustment problems age 12			
	Emotional problems β (95%CI)	Aggressiveness β (95%CI)	Poor school performance β (95%CI)	Substance use OR (95%CI)
Model 1: Univariate associations				
Antisocial behaviours	0.026 (0.023, 0.030)**	0.047 (0.044, 0.050)**	0.019 (0.016, 0.023)**	1.056 (1.042, 1.070)**
Bullying	0.882 (0.678, 1.086)**	1.663 (1.435, 1.890)**	0.653 (0.447, 0.858)**	12.049 (5.884, 24.671)**
Model 2: Multivariate associations				
Antisocial behaviours	0.029 (0.024, 0.034)**	0.048 (0.044, 0.052)**	0.021 (0.016, 0.026)**	1.030 (1.011, 1.048)**
Bullying	-0.174 (-0.404, 0.056)	-0.101 (-0.319, 0.117)	-0.110 (-0.387, 0.167)	3.718 (1.478, 9.354)*
Dunedin Multidisciplinary Health and Development Study				
	Adjustment problems age 32			
	Emotional problems β (95%CI)	Violent conviction OR (95%CI)	Not graduating school OR (95%CI)	Substance problems OR (95%CI)
Model 1: Univariate associations				
Antisocial behaviours	0.204 (0.152, 0.256)**	1.624 (1.383, 1.907)**	1.542 (1.362, 1.745)**	1.281 (1.130, 1.453)**
Bullying	0.372 (0.146, 0.598)**	4.276 (2.242, 8.156)**	2.919 (1.782, 4.780)**	2.148 (1.266, 3.644)**
Model 2: Multivariate associations				
Antisocial behaviours	0.262 (0.193, 0.331)**	1.584 (1.272, 1.974)**	1.601(1.359, 1.887)**	1.265 (1.064, 1.503)**
Bullying	-0.371 (-0.666, -0.077)*	1.162 (0.467, 2.890)	0.788 (0.401, 1.549)	1.084 (0.521, 2.257)

Note: Linear and logistic regression analyses adjusted for gender. β = standardised beta coefficient, OR = odds ratio, CI = confidence intervals. * = p ≤ 0.05 ** = p < 0.01 + = p ≤ 0.10

6.5 Discussion

This study aimed to investigate if bullies and children with antisocial behaviours are two similar groups of vulnerable children utilising data collected in two nationally representative longitudinal cohorts of children from the United Kingdom and New Zealand. Using a series of analyses, the present study highlights three key findings, which warrant further discussion. Firstly, bullies and children with high levels of antisocial behaviours had similar risk factors in childhood. Bullies were more strongly characterised by these risk factors in childhood in comparison to children with moderate levels of antisocial behaviours. Secondly, being a bully or having high levels of antisocial behaviours was a significant predictor of later adjustment problems in early adolescence and adulthood. Children with moderate levels of antisocial behaviours during childhood were at a lower, but significant, risk of developing adjustment problems in adolescence and adulthood. Thirdly, being a bully had an independent effect on substance use in adolescence and emotional problems in adulthood, over and above the risk posed by having antisocial behaviours. Similarities between bullies and children with high levels of antisocial behaviours suggest that bullies are on the severe end of the spectrum of antisocial behaviours. Identifying bullies at an early age may be an effective way of identifying children with high levels of antisocial behaviours.

The role of early risk factors

In agreement with previous findings, our findings showed that bullies and children with antisocial behaviours had low IQ, were more undercontrolled and belonged to a high-risk family environment (Farrington & Baldry, 2010; Moffitt, 2007). Our findings extend those of previous studies by showing that bullies and children with high antisocial behaviours are similar in their early risks. Children with moderate levels of antisocial behaviours were exposed to a lower level of risk in comparison to bullies. These findings indicate that there may be a dose response relationship between exposure to early environmental risk and the levels of antisocial behaviours children engage in. By identifying children who show early signs of less severe risk, the impact these risk factors have upon their future behaviours may be dampened and therefore minimise children going on to engage in high levels of antisocial behaviours.

Our findings also showed that bullies had the poorest ToM in early childhood. This finding is of particular interest as it further weakens the argument that bullies are

‘skilled social manipulators’ with high levels of ToM (Sutton et al., 1999). Although bullies and children with high antisocial behaviours did not significantly differ from one another in their IQ and executive functioning, they did in their levels of ToM. As bullying is specific to the social or peer context and high antisocial behaviours can encompass behaviours that are external to the social context such as property damage, this finding further supports the importance of the role of typically developed ToM as a contributor for healthy social interactions.

In contrast to previous studies bullies and children with antisocial behaviours did not significantly differ from controls (Coolidge et al., 2004; Hughes et al., 1998), and one another on their executive functioning. Our study differed from others by taking into account related cognitive functions such as IQ and ToM when assessing the relationship between executive functioning and children’s negative behaviours. Findings therefore suggest that the effect of IQ and ToM in early childhood is stronger and overrides the contribution of executive functioning in shaping children’s bullying and antisocial behaviours. Our finding may also differ from previous studies due to our measure of executive functioning and our characterisation of bullies and children with antisocial behaviours. As detailed in a recent meta-analysis, variation in findings across studies has been accounted for by differences in measures of executive functioning (e.g. modular assessment of functions such as working memory vs. overall functioning) and characterisation of groups (e.g. psychopathic antisocial behaviour vs. criminal antisocial behaviour) (Morgan & Lilienfeld, 2000).

Bullies and children with antisocial behaviours also did not significantly differ from controls and one another in the levels of maternal warmth they received in early childhood in the Dunedin study cohort. These findings differed from the observation in the E-Risk cohort and are in contrast to previous studies (Bowes et al., 2009; Feinberg, Button, Neiderhiser, Reiss, & Hetherington, 2007). This discrepancy may be explained by the nature of our measure. Firstly, maternal warmth was assessed in E-Risk by asking mothers’ to talk about their child for 5 minutes. In contrast in the Dunedin cohort, psychologists and doctors were asked to separately rate mothers on their general attitude and behaviour in relation to their child. Secondly, measures of maternal warmth in the Dunedin cohort were collected when children were aged 3. It is possible that because this measure is distal time-wise to children’s bullying and antisocial behaviours

(age 7- 11), other proximal factors may have a more important effect on shaping children's bullying and antisocial behaviours. We did not observe this effect within the E-Risk study as measures of maternal warmth were collected at a later age of 5 years. The nature of our analyses may also help to explain why findings from the Dunedin study were not in line with other studies. Analyses testing the association between family factors and children's bullying and antisocial behaviours were included in one model to account for the potential overlap between family factors. Therefore our findings suggest that low maternal warmth at age 3 did not contribute towards children's bullying and antisocial behaviours over and above the effects of family conflict, low SES and child maltreatment.

Negative outcomes in later life

Children who bullied others or engaged in antisocial behaviours during childhood experienced significantly higher levels of adjustment problems in adolescence and adulthood compared to controls. Our findings support previous longitudinal associations between bullying and antisocial behaviours in childhood and elevated levels of adjustment problems in later life (Bender & Losel, 2011; Colman et al., 2009; Farrington et al., 2009; Sourander et al., 2007). This indicates that children's engagement in these negative behaviours is not only having an impact on individuals towards whom the negative behaviours are targeted at (i.e. victims of bullying) (Arseneault et al., 2010), but also on the well being of the children themselves (i.e. bullies or children with antisocial behaviours). Findings thus suggest that both bullying and antisocial behaviours are an early childhood marker for a lifetime of adversities and should be considered on par with one another as a childhood risk factor for difficulties in adult life.

The unique effect of bullying upon children's adjustment problems

Bullying had a unique effect upon children's substance use in adolescence and emotional problems in adulthood over and above the effects of antisocial behaviours. Interestingly, being a bully was associated with a reduction of emotional problems over and above the contributions of antisocial behaviours in adulthood (Dunedin cohort) and not adolescence (E-Risk cohort). This may be suggestive of a developmental protective effect whereby engagement in bullying in childhood has a desensitising effect, which overtime translates into reduced emotional problems in adulthood. We do not observe

this effect with emotional problems in adolescents because the engagement in bullying behaviours may not be distal enough and children may still be involved in bullying which is resulting in the continuation of heightened levels of emotions and their problems. This suggestion should however be considered with some caution. Although being a bully was associated with having reduced levels of emotional problems in adulthood, this may be indicative of other problems such as a lack of emotional awareness. Bullies tend to have low levels of empathy and high levels of callous-unemotional traits (Jolliffe & Farrington, 2006; Olweus, 1993; Viding, Simmonds, Petrides, & Frederickson, 2009). It is thus possible that bullies find it difficult to be fully aware of their own emotions as well as others' emotions, and are thus less likely to develop emotional problems in adulthood such as anxiety and depression. Although low empathy and callous-unemotional traits can be characteristics of youth who engage in high levels of antisocial behaviours more generally (Frick & Dickens, 2006), these characteristics may be particularly important for bullies due to an increased element of face to face interaction. This may consequently result in bullying being an independent contributor towards the development of lower levels of emotional problems over and above that of antisocial behaviours.

It is important to note that although our findings indicating that bullying has a unique effect on substance use in adolescence and emotional problems in adulthood is of interest, it needs to be considered cautiously. Substance use within the E-Risk Study cohort is low in prevalence and unevenly distributed. It is therefore possible that the 'true' effect of antisocial behaviours is not being accounted for in the analyses reported in Table 14. This may also explain why we observe bullying to have an independent effect on substance use in adolescence within the E-Risk sample and not in adulthood within the Dunedin where substance use is more prevalent. Furthermore, as the majority of children who bullied others also had other antisocial behaviours, the unique effect of bullying on emotional problems is being driven by a small number of 'pure bullies', thus further research is required with large study samples to replicate this finding. Moreover, as bullying did not uniquely contribute to the other adjustment problems, it provides more reason for these observations to be replicated.

Limitations and strengths

The present study had some limitations. First, our measure of bullying was comprised of a single item reported on by mothers and teachers. A more detailed measure may help to support the reliability of our findings. Second, the groups of children who bullied others did not consist of a group of ‘pure’ bullies who were only bullies and had no other antisocial behaviours. This was due to there being very few children who were ‘pure’ bullies (the E-Risk Study: $N = 24$, the Dunedin Study: $N = 4$). The inclusion of this group would have allowed us to further test the specificity of bullying behaviours with relation to children’s antisocial behaviours. However, the fact that we did not observe many children to be ‘pure’ bullies further reinforces the idea that bullies are on the severe end of the spectrum of antisocial behaviours where individuals engage in a number of other antisocial behaviours. Third, mothers’ and teachers’ both reported on bullying and antisocial behaviours using a single instrument which may have inflated the similarities observed between the groups as a result of shared methods variance. Fourth, when investigating the similarities between bullies and children with antisocial behaviours, we did not distinguish between the types of bullying and antisocial behaviours, nor did we include a clinically diagnosed group (i.e. conduct disorder). This additional level of analyses would have allowed us to further investigate the underlying mechanisms, which may contribute towards the similarities and differences between bullies and children with other antisocial behaviours. Future research would benefit from taking the types of bullying and antisocial behaviours into consideration as they may provide a more detailed profile of children who become bullies and engage in antisocial behaviours.

Although subjected to some limitations this study had a number of strengths. Firstly, using data from two large cohorts we were able to replicate our finding of bullies and children with high antisocial behaviours having similar antecedents and adjustment problems in later life. Secondly, we demonstrated that findings from the E-Risk Study were not specific to twins but also replicable amongst singletons in the Dunedin Study cohort. Thirdly, we were not only able to replicate the findings but also show that observations are representative of a group born in the early 70’s (the Dunedin Study) and a more contemporary group (the E-Risk Study) of children born in the 1990s. It would thus seem that secular changes have not significantly affected associations between bullying and its antecedents or sequelae.

Implications

Within its limits, this study highlights that bullies are similar to children with severe antisocial behaviours. Studying bullies may not provide us with any new information with regards to children's early risk factors and later adjustment that we do not already know from studying children with high levels of antisocial behaviours. However studying bullies may be a way of enhancing our ability to recognise children with high antisocial behaviours early in life and consequently help reduce the persistent detrimental effects these behaviours have on long term physical and mental health (Odgers et al., 2008). Furthermore, for researchers using fewer items to assess bullying may be a cost- and time-effective way to identify children vulnerable for engaging in high antisocial behaviours, in place of the extensive criteria that is currently used to assess antisocial behaviour problems. This may be especially relevant for studying antisocial behaviours amongst young children for two reasons. Firstly, there is some concern that young children may not have yet developed adequate cognitive abilities to understand the concepts being assessed (Measelle et al., 1998). By using fewer items in assessments with children, researchers may have more time to ensure that children comprehend what is being asked of them. Secondly, researchers currently rely heavily on the reports of teachers and parents when collecting information about children's antisocial behaviours. However, due to some parents or teachers being too busy to complete more lengthy measures, researchers may run the risk of not capturing information for all children. By using fewer items to assess bullying as an early marker for high levels of antisocial behaviours, researchers can maximise the number of children for whom they can collect reports. For these reasons and those discussed thus far, studying bullies is not only an informative manner in which to understand an element of antisocial behaviours which are specific to the peer context, but also as a way of understanding children with high levels of antisocial behaviours.

7 General Discussion

The findings presented in this thesis have been discussed in detail in each of the empirical chapters. The objective of this chapter is to provide a general discussion of the underlying themes presented in this thesis. It will present the contribution this piece of research has made to provide a better understanding of the role of cognitive development in children's involvement in bullying and adjustment problems. It will also address the wider implications for future research and professionals concerned with children's wellbeing.

7.1 Summary of key findings

This thesis aimed to advance current aetiological understanding of bullying through the investigation of cognitive developmental pathways underlying youths' vulnerability for being involved in bullying. It examined the role of cognitive processing in relation to children's adjustment problems. Utilising longitudinal prospective data, this research investigated the role of cognitive development amongst the lives of children involved in bullying in three ways. It examined cognitive processes as (1) an early predictor of children's involvement in bullying, (2) an outcome of bullying victimisation in childhood and (3) a differential marker for identifying bullies from children with antisocial behaviours.

The first empirical study (chapter 4) investigated whether early cognitive functioning, namely theory of mind (ToM), acted as a developmental marker for children's later involvement in bullying. Based on a nationally representative longitudinal sample, findings showed that having poor ToM in early childhood predicted children's involvement in bullying as victims and bully-victims after accounting for child-specific and family factors in early adolescence. Findings also indicated that for bullies the risk posed by having poor ToM was overridden by the influence of exposure to socioeconomic deprivation and child maltreatment. This chapter further investigated whether emotional and behavioural problems during middle childhood acted as an underlying mechanism through which children's early poor ToM skills translated to children's later involvement in bullying. Results indicated that emotional and

behavioural problems did not explain the association between poor ToM and adolescent bullying experiences.

The second empirical study (chapter 5) examined the role of bullying victimisation for children's cognitive processing of their environments and tested whether these processing skills are associated with their adjustment problems. Using the discordant MZ twin study design as a rigorous method to control for a wide range of confounders including genetic and familial factors, this study compared attributional styles between non-bullied twins and their co-twins who were bullied. Results indicated that bullied twins reported biased interpretation of their environments by attributing the causes of negative events to reasons that were more internal, global and stable in comparison to their non-bullied co-twins. They did not differ from non-bullied twins when interpreting the causes of positive events. Furthermore, children who used negative attributional styles when interpreting negative events were more likely to have higher levels of emotional and behavioural problems.

The third empirical study (chapter 6) tested whether early cognitive functioning acted as a marker for bullies when compared to non-bullies who have other antisocial behaviour problems. Using longitudinal data from two epidemiological cohorts from different continents and decades, this study showed that bullies did not significantly differ from children with high antisocial behaviours in their early cognitive processing, temperament and family environment from children with high antisocial behaviours, but they were different from children with moderate antisocial behaviours. Being a bully and having antisocial behaviours was a significant predictor of later adjustment problems in early adolescence and adulthood. Being a bully had an independent effect on children's substance use in adolescence and emotional problems in later adulthood over and above the risk posed by other antisocial behaviours.

Altogether, these findings demonstrate that deficits in early cognitive functioning have an influential function in shaping the role children adopt when becoming involved in bullying (i.e. as bullies, victims or bully-victims). Cognitive functioning underpins children's behaviours and wellbeing and therefore presents itself well as a candidate for being an underlying mechanism that contributes to adjustment problems amongst

children involved in bullying. Results further reinforce that childhood is an important period for the development of both cognitive functioning and healthy peer relationships.

7.2 The role of cognitive processing for children's involvement in bullying

Research findings presented in this thesis contribute to the aetiological understanding of bullying behaviours through the extension of current theoretical models. The socio-ecological model for bullying behaviours proposes that human behaviour, in this case bullying, is the function of an individual's interactions with his or her environment (Bronfenbrenner, 1979). Findings from this thesis further develop this assumption by showing that the ways in which these interactions are interpreted also play a key role. This thesis shows that cognitive skills act as a filter through which information and interactions are perceived and understood, and consequently contributes to bullying behaviours. Furthermore our findings also lend support to the social information processing model (Crick & Dodge, 1994; Dodge, 1986) and the social skills deficit model (Dodge, 1980). First proposed as an explanation for aggressive behaviours, the models suggest that deficits in children's cognitive functioning alters their ability to accurately encode social interactions, resulting in biased interpretations of ambiguous situations as being hostile and consequently resulting in aggressive or hostile behaviours. Extending the models, our findings that children involved in bullying have poorer cognitive functioning than non-involved children, show that in addition to aggressive behaviours, maladaptive information processing also contribute towards bullying behaviours. It shows that maladaptive information processing not only influences negative behaviours directed towards others, such as aggressiveness and bullying perpetration, but also behaviours that may increase children's vulnerability for being victimised.

The overarching findings from this thesis indicate that deficits in cognitive abilities place children at an increased risk of being involved in bullying as bullies, victims and bully-victims. Variations in cognitive functioning, in particular ToM, as shown in this piece of work, are characteristics of children's different roles in bullying (i.e. bullies, victims and bully-victims) and can therefore be considered as early risk indicators. In line with the current body of literature identifying child-specific characteristics as risk factors for children's involvement in bullying (Arseneault et al., 2010; Farrington & Baldry, 2010), these findings demonstrate that children's early cognitive developmental

processes also have an influential effect on later outcomes. As cognitive skills such as ToM develop predominantly in childhood (Perner and Wimmer, 1985) they share their developmental context with children's early exposure to peer groups and social relationships, and are thus in a position of having a contributory effect on children involvement in bullying.

This thesis also showed that in addition to cognitive functioning having a predictive effect on children's involvement in bullying, cognitive functioning is also influenced by children's experiences of bullying victimisation. Consistent with findings from other studies, bullied children had biased cognitive attributional styles in comparison to non-bullied children. In particular bullied children interpreted the cause of negative events as being due to reasons related to themselves (internal), general across situations (global) and consistent over time (stable) (Gibb et al., 2004; Mezulis et al., 2006). This finding suggests that experiencing bullying victimisation is associated with children viewing negative events on the whole as being due to reasons, which they are accountable for and cannot escape.

Altogether, findings from this thesis are suggestive of the relationship between children's cognitive processes and involvement in bullying potentially being reciprocal. This research has shown that cognitive functioning can play differential roles within the lives of children involved in bullying. Children's cognitive functioning can act as an early antecedent for children's involvement in bullying behaviours, and also be influenced by the bullying experience itself and contribute towards future behaviours and wellbeing. This reciprocity is suggestive of cognitive functioning being an underlying mechanism which is associated with children's social interactions, in particular those with their peers throughout childhood and early adolescence.

Not only is cognitive functioning an important mechanism underlying children's involvement in bullying, it is also possible that children's cognitive functioning at different developmental points interact with their social environments (i.e. peer interactions) and consequently influences one another indirectly. For example, findings from this thesis have shown that poor ToM is an early marker of children's involvement in bullying. It is possible that through increasing children's risk of being victims of bullying, theory of mind skills also influence victimised children's attribution biases.

Analyses for the role of cognitive function in relation to children's involvement in bullying could be extended to test the hypothesis that bullying mediates a relationship between poor ToM and cognitive attribution styles.

7.3 The role of cognitive processing for children's adjustment problems

In addition to investigating cognition as a potential underlying mechanism contributing to adjustment problems amongst children involved in bullying, this thesis also explored the relationship between adjustment problems and children's involvement in bullying. Three specific findings provided some insight into these relationships.

Firstly, it is well documented that children with adjustment problems are at an increased risk of being involved in bullying (Arseneault et al., 2006; Sourander et al., 2000). Our findings extend this association by showing that children's adjustment problems in middle childhood contributed to children's risk of being involved in bullying as bullies, victims and bully-victims independently of their ToM skills. This suggests that although children's early cognitive functioning is a key component involved in shaping children's involvement in bullying, having adjustment problems such as emotional and behavioural problems increases children's risk of being involved in bullying over and above the risk posed by having deficits in cognition functioning.

Secondly, we found that in keeping with previous studies children who used negative attributional styles to explain the occurrence of negative events had higher levels of behavioural problems and showed a trend for having elevated levels of emotional problems (Hankin & Abramson, 2002; Jacobs et al., 2008; Rowe et al., 2006; Weiss et al., 1998). This suggests that cognitive processing styles involved in children's understanding of events play a key role in shaping their adjustment problems. It further reinforces the assumption that biased interpretation of the occurrence of negative events may contribute to feelings of helplessness and frustration, which in turn manifest into emotional and behavioural problems (Abramson et al., 1978; Toth et al., 2002). Furthermore this finding may be of importance in understanding why bullied children develop adjustment problems. Results from this thesis also showed that children who are bullied have negatively biased attributional styles. As bullied children have negative attributional styles and negative attributional styles are associated with adjustment

problems, it is possible that cognitive attributional styles act as a mechanism by which being bullied translates into an increased risk of developing adjustment problems.

Thirdly, this work showed that children who bullied others had significantly higher levels of adjustment problems in adolescence and adulthood compared to controls. Our findings support previous longitudinal associations between bullying in childhood and elevated levels of adjustment problems in later life (Farrington & Ttofi, 2011; Nansel et al., 2001; Sourander et al., 2007). They show that the negative experience of bullying is not only detrimental for the victims, towards whom these negative behaviours are targeted, but also the bullying perpetrators themselves. The negative outcomes associated with being a bully are not only constrained to the immediate future but also extends into adulthood. Bullying others may therefore be an early marker for lifelong adversities and should be considered on par with other childhood risk factors such as child maltreatment (Gilbert et al., 2009; Manly et al., 2001) and antisocial behaviours (Odgers et al., 2008).

7.4 Contribution of this research

The work presented in this thesis contributes some novel insight into the developmental role of cognitive functioning in children's involvement in bullying behaviours and associated adjustment problems.

Utilising a developmentally sensitive longitudinal study design, this thesis demonstrates the impact early cognitive deficits can have on children's later behaviours. It provides a unique insight into the relationship between ToM and children's bullying behaviours, by investigating the role of ToM and children's later involvement in bullying within a developmental context. In contrast to previous studies, which have been cross-sectional or spanned only a short period of time, (Gini, 2006; Monks et al., 2005; Sutton et al., 1999), this study investigated children's development across 7 years (age 5 to 12). It further included a measure of bullying that was taken at a key school transitional point (moving to secondary school) in children's lives. Findings showed that children's cognitive deficits in early childhood influence their bullying behaviours in early adolescence. It thus suggests that the impact of having cognitive deficits in early childhood is not constrained to immediate behaviours but extends throughout children's development into early adolescence. Furthermore, this study examined the role of ToM

amongst bullies, victims and bully-victims within one cohort. By including all three groups of children involved in bullying behaviours, this study allowed for the role of ToM to be investigated in relation to children's key roles when being involved in bullying. More specifically this study provided an insight into bully-victims by showing that not only do bully-victims fare the worst, with the highest level of adjustment problems, but they also have the highest cognitive deficit in early childhood. This further reinforces that bully-victims are the most vulnerable group of children involved in bullying behaviours. This work further extended the current understanding of the role of ToM amongst children involved in bullying behaviours by accounting for a large number of child specific and family factors which have otherwise been associated with having poor ToM or being involved in bullying. To date no other studies have included such a comprehensive list of confounders within its analyses (Gini, 2006; Monks et al., 2005; Sutton et al., 1999). The inclusion of these confounders has allowed this study to gain a better understanding of the current mixed findings for bullies (Monks et al., 2005; Renouf et al., 2010; Sutton et al., 1999). It showed that although bullies had poor ToM in early childhood the impact of having poor ToM on children's later bullying perpetration was overridden by socioeconomic deprivation and child maltreatment, suggesting that these family risk factors are more detrimental than cognitive deficits (ToM) for children's risk of engaging in later bullying perpetration. Finally, the longitudinal study design and comprehensive adjustment of confounding factors has allowed for some degree of temporal priority to be determined. The stringent investigation of the association between ToM and bullying behaviours increases confidence in the relationship not being spurious.

Work from this thesis showed that bullying victimisation is a stressful life experience that is associated with biased cognitive attributional styles. This study employed a novel approach by using a discordant MZ twin design to control for genetic and environmental factors and capitalised on multiple informant reports of bullying victimisation to rely on a strict criterion of 'victimisation' status. To the best of our knowledge, no other study to date has employed such a study design when investigating cognitive attributional styles amongst bullied children. Furthermore, only two other studies have investigated the association between bullying victimisation and cognitive attributional styles and their results did not account for the confounding effect of genes (Gibb et al., 2004; Mezulis et al., 2006). This is an important confounder to take into

account, as previous research has shown that bullying and cognitive attributional styles are both in part heritable (Ball et al., 2008; Lau et al., 2006). Findings further indicate that the relationship between bullying victimisation and cognitive attributional styles is environmentally driven. As described in chapter 3, the discordant MZ twin design capitalises on the fact that MZ twins are genetically identical and any differences between MZ twins growing up in the same family must be due to environmental factors that are unique to each twin. Bullying victimisation was identified as a unique environmental experience within a twin pair where one twin had been bullied and the other had not. By testing whether within-pair differences in being bullied are associated with differences in children's cognitive attributional styles, findings from this study indicate that bullying victimisation is a negative life experience which is environmentally-associated with children's negatively biased choice of attributional styles. Bullying victimisation should thus be considered on par with other adverse life events which can contribute to the development of negative attributional styles (Peterson & Seligman, 1984). Furthermore, in addition to investigating the association between cognitive attributional styles and emotional problems, this study also examined the relationship with behavioural problems. Current literature has primarily focused on emotional problems such as depression (Garber et al., 2002; Nolen-Hoeksema et al., 1992), thus making this study not only a contributor to the limited number of studies investigating bullying and cognitive attributional styles but also to those investigating cognitive attributional styles and behavioural problems.

The findings reported in this thesis also contribute towards understanding the aetiology of bullying by showing that bullies share a similar behavioural 'profile' to children with high levels of antisocial behaviours by having similar predictors and later outcomes. This thesis makes a unique contribution by comparing bullies and children with moderate and high levels of antisocial behaviours. Numerous studies have identified antecedents and outcomes of bullying and antisocial behaviours (Bowes et al., 2009; Farrington & Ttofi, 2011; Moffitt, 2007; Odgers et al., 2008), which has allowed parallels to be drawn between the two groups of children. However, to the best of our knowledge, no other study has statistically tested whether children who bully others are similar to children with other antisocial behaviours. Furthermore this study showed that bullies share similar profiles to children with high levels of antisocial behaviours, suggesting that being a bully is as severe a form of behaviour as engaging in high

antisocial behaviours. Findings from this study further contribute to our understanding of bullying and antisocial behaviours by identifying similar antecedents and outcomes across two cohorts, a contemporary cohort of children born in the United Kingdom and a cohort of children born in the 1970's in New Zealand. This suggests that being exposed to early risk factors and developing negative outcomes as a result of engaging in bullying and antisocial behaviours are similar across developed countries and withstand the test of time. This further reinforces the validity and reliability of the finding presented and highlights the importance of identifying and helping children who are at an increased risk of being involved in bullying and antisocial behaviours.

7.5 Methodological evaluation

The research presented in this thesis has a number of important methodological strengths and limitations, which should be considered when interpreting the findings. Discussion of strengths and limitations specific to each of the empirical studies can be found in their respective chapters (chapters 4 to 6). More general strengths and limitations are discussed below.

7.5.1 Strengths

Firstly, data used in this research were taken from the E-Risk Study, which is a large population sample of 2,232 children and their families. The E-Risk study retained 96% of the original cohort. These high response rates rule out the possibility that attrition introduced biases in the findings as a result of an over or under representation of a specific demographic group. For example, high risk families may be less likely to take part due to chaotic lives, therefore resulting in the study cohort no longer remaining nationally representative and having an inflated numbers of low risk families. Secondly, the E-Risk cohort included reports from multiple informants (i.e. parents, teachers, interviewer ratings and clinicians) and utilised multiple methods (i.e. computerised tasks, 'speech' coding, interviews and observations). This multiple informant and method approach strengthens the findings by supporting the validity and reliability of the data. It further provides a holistic portrayal of the measures by incorporating multiple perspectives. Thirdly, data were collected prospectively across multiple assessment phases ranging from age 5 to 12 years. The longitudinal and prospective nature of the data collected allowed for cognitive functioning to be investigated as an early predictor, an outcome and a differential marker. It has enabled the hypotheses presented in this

thesis to be tested within a developmental context, accounting for key periods of developmental sensitivity and transition (i.e., starting schooling, or the transition of primary to secondary school). In addition these methodological attributes of the data has allowed for inferences about the direction of effects to be formed. Fourthly, the extensive measures of development and environmental risk from multiple informants allowed analyses to account for a number of confounders, including child specific and family wide factors. Furthermore as the E-Risk Study follows the development of dizygotic and monozygotic twins, analyses further accounted for genetic factors because monozygotic twins share 100% of their genes. For example, by investigating differences between monozygotic twin pairs the contribution of genes on the observed outcome is accounted for because both twins within a twin pair have the same genes. Any differences within a twin pair can therefore be explained by environmental factors that are unique to each twin.

Finally, the last empirical study of this thesis utilised data from two cohorts, the E-Risk Study and the Dunedin Study. Sharing similar strengths as the E-Risk study, the Dunedin Study is a longitudinal prospective cohort of 1,037 participants who are now adults from New Zealand. Data were collected prospectively across multiple assessment phases ranging from age 3 to 32, with a high retention rate of 96% of the original cohort participating when the participants were 32 years old. The inclusion of two cohorts allowed for findings to be replicated and showed that observations were representative of a group of singletons born in the early 70's (the Dunedin Study) and a more contemporary group (the E-Risk Study) of twins born in the 1990s.

7.5.2 Limitations

Firstly, the E-Risk Study consisted of a cohort of twins and it is not certain whether findings from this sample can be generalised to singletons. It is possible that twins are at an increased risk of being involved in bullying due to them being 'different' from others as they share physical attributes (in the case of identical twins) or have a unique bond with their co-twin. Twins may also have a higher risk of experiencing cognitive deficits in early childhood such as reading delays than singletons (Webbink, Posthuma, Boomsma, de Geus, & Visscher, 2008). However, similar prevalence rates of involvement in bullying between the E-Risk Study and samples of singletons suggest that our findings are not specific to twins (Craig et al., 2009). Furthermore the

replication of findings from the E-Risk Study in the Dunedin Study indicates that findings from twin and singleton samples converge to the similar conclusions.

Secondly, our measure of involvement in bullying did not distinguish between different types of bullying behaviours and victimization (e.g. indirect vs. direct bullying). This would have allowed for the further investigation into the role of cognitive functioning in relation to the types and complexities of different bullying behaviours. This information would have provided a more detailed account of how cognitive functioning shapes different types of behaviours and help to understand why some types of cognitive functioning (i.e. ToM) may be more important for some types of bullying behaviours and not others. This additional information would have also allowed for the formal testing of the hypotheses that ToM may play a more pivotal role in indirect bullying behaviours, such as social exclusion and manipulation of friendship groups, where an advanced ability to understand others mental states would be advantageous. A more detailed measure would also have allowed for the extension of the longitudinal analyses to investigate whether cognitive functioning has a differential role for specific types of bullying behaviours from one time point to another. For example is ToM more important for indirect bullying when children are older in comparison to when they are younger and friendship groups are more malleable.

Thirdly, a measure of bullying victimisation was not collected in the Dunedin Study cohort. The inclusion of this measure would have allowed us to try and replicate and explore further the role of cognitive functioning with relation to bullying victimisation. It would have also allowed us to formally test whether findings based on the UK cohort could be generalised to other developed countries such as New Zealand.

Fourthly, although both the E-Risk Study and the Dunedin Study utilised reports from multiple informants (including parents and teachers) and collected information on a vast number of environmental factors, they did not include measures collected from peers about children's behaviours nor about children's friendships and peer groups. As a large proportion of bullying occurs within the school environment where peers are present, this additional source of information would have maximised the capture of all instances of children's involvement in bullying. However as discussed earlier in this thesis, using peers as informants involves a number of limitations which may lead to biases. The

additional information about children's friendship and peer groups would have helped to gain a better understanding of the aetiology of bullying behaviours. For example, victims of bullying are more likely to have friends who have also been victimised or who are less accepted by their peers (Hodges, Malone, & Perry, 1997). Peers also influence bullying behaviours by helping bullies maintain their negative behaviours (Patterson, 1989). By collecting this additional information, analyses could have adjusted for these factors and further help reinforce the main findings from this thesis.

Fifthly, although one of the strengths of this thesis is the inclusion of a wide range of environmental factors, including child specific and family wide factors, this thesis could not account for all possible confounding factors. The inclusion of other possible confounding factors would have strengthened the findings from this thesis. For example, there is evidence to support an association between mothers' and children's cognitive functioning, whereby the children of mothers who have hostile attribution biases are more likely to have similar biases (Nelson, Mitchell & Yang, 2008). The inclusion of measures of maternal cognitive functioning would have allowed to eliminate the potential confounding effect maternal cognitive functioning may have on the observed association between cognitive functioning and children's involvement in bullying as bullies, victims and bully-victims.

The relationship between twin pairs may also be another important factor to take into consideration. There is evidence to suggest that the quality of interactions with siblings plays an important role in shaping children's ToM skills (Hughes & Ensor, 2005). Although this thesis did take into account the number of siblings, information specific to the relationship between twins and their co-twins would have been a more a stringent measure. The nature of twins' relationships with one another may also play an important role in children's bullying experiences. For example, having a good relationship with their co-twin may help children to deal more effectively with the negative experience of bullying. In contrast, having a bad relationship with a co-twin may result in one twin bullying the other. The consideration of the relationship between twins and their co-twins in this thesis, would have allowed to test if twins' relationships with one another differentiates the impact of being bullied on later outcomes, and associations with cognitive functioning. However, it is important to note that mothers'

and children's description of bullying victimisation incidents implicated that the bullies were from outside of the family in nearly all cases.

7.6 Implications for research and policy

7.6.1 Implications for research

This thesis provides evidence to support children's early cognitive functioning as a developmental marker for the bullying 'profiles' (i.e. bullies, victims or bully-victims) children adopt during their schooling years. This suggests that research investigating the aetiological pathways distinguishing children's different bullying 'profiles' could benefit from further exploring cognitive abilities. For example, identifying differential cognitive processing in relation to specific bullying behaviours could help researchers' understanding of how different mechanisms link information processing to maladaptive behaviours. More specifically focusing on the role of ToM would be informative, as findings from this and other studies have shown ToM skills have a contributory effect in shaping children's peer interactions (Gini, 2006; Monks et al., 2005; Sutton et al., 1999). Researchers could further extend this line of investigation by exploring 'why' and 'how' having difficulties in understanding other people's beliefs and thoughts (poor ToM) shapes children's behaviours and promotes bullying behaviours. Findings from this thesis found that children's emotional and behavioural problems did not moderate the effect of having poor ToM in early childhood on children's later involvement in bullying. Future researchers could explore other potential factors that may have a moderating effect. For example poor ToM has been associated with poor emotion recognition, poor communication, and poor executive function in children. Each of these could play an important role in peer interaction and bullying involvement (Filippova & Astington, 2008; Henning et al., 2011), therefore making them prime candidates for further investigation.

Furthermore, findings from this thesis also highlight that atypical forms of cognitive processing can contribute towards children's adjustment problems. As cognitive deficits have been linked with both bullying and adjustment problems, this may be an important factor for researchers to focus on when investigating translational tools through which bullying influences children's adjustment problems. By utilising longitudinal prospective data from large cohorts, researchers could investigate whether cognitive

skills (i.e. cognitive attributional styles) mediate the relationship between being involved in bullying and developing adjustment problems. By also incorporating genetically sensitive designs (i.e. discordant MZ design) along with longitudinal prospective data, researchers may gain a better understanding of temporal priority and begin to draw inferences of causality.

This piece of research has also reinforced the importance of accounting for other child-specific and family factors when investigating the link between cognitive functioning and bullying behaviours. Future researchers would benefit from accounting for such factors to ensure the reliability and validity of their findings. Furthermore as children are exposed to their home environment and peers the most during childhood, investigating developmental processes such as cognitive functioning independent of the other would not provide a holistic account of how children's early development shapes their later behaviours.

7.6.2 Implication for policy

Findings from this thesis provide empirical evidence to support the role of cognitive functioning as underpinning human behaviours and social interactions such as bullying. Cognitive functioning may therefore be an important component to consider when designing and implementing anti-bullying intervention practises. Some anti-bullying schemes have incorporated cognitive based training within their programs by using whole school based approaches and training staff and pupils within schools. For example the Social Skills Group Intervention (S.S.GrIn), is a social skills intervention for children experiencing peer dislike, bullying and social anxiety (DeRosier, 2004). By combining social learning and cognitive behavioural techniques through role-play, modelling and hands on activities, this programme is designed to promote social skills. Children who participated in the programme reported being more liked by their peers, and having enhanced self-esteem and self-efficacy (DeRosier, 2004). Aggressive children also showed a decline in their bullying and aggressive behaviours after partaking in the intervention sessions. This programme has also been proven beneficial in tackling bullying and its associated problems and is thus an example of how children's cognitive based skills can be successfully focused upon within anti-bullying interventions. Findings from this thesis further reinforce the role of cognitive

functioning as a component to incorporate within policies focusing on bullying interventions.

The role of cognitive skills as a differential marker for children's involvement in bullying, suggests that programmes may be more beneficial by shaping cognitive based interventions that are tailored to specific bullying roles. For example, strategies focusing on improving ToM skills alone may not be as beneficial for bullies because of the important role played by socio-economic deprivation for bullying behaviours. However, focusing on improving ToM skills for victims could be an efficient strategy. Evidence suggests that discussing scenarios of false-belief and mental states improves children's understanding of false-belief and use of mental state terms (Appleton & Reddy, 1996; Guajardo & Watson, 2002). Employing such training strategies could help improve ToM skills, which in turn may help reduce children's vulnerability for becoming victims or bully-victims later in life. Furthermore, as family factors (i.e. parent child relationship) are also associated with overall cognitive development and bullying behaviours, involving parents as well as teachers in assisting children's cognitive development may enhance the effectiveness of cognitive based interventions.

The overarching aim of anti-bullying interventions is to reduce children's involvement in bullying. However interventions may not be equally effective for all those involved (i.e. bullies and victims). Consequently, in instances when bullying behaviours are persistent, employing strategies to minimise the negative impact of such behaviours may be an alternative route. Findings from this thesis provide an indication that targeting children's cognitive processing styles may help in reducing their risk of developing adjustment problems. Cognitive based strategies have been shown to be effective in reducing children's adjustment problems (Mun~oz-Solomando, Kendall, & Whittington, 2008). For example 'Stressbusters' is a cognitive based interactive computer programme designed to help adolescents with depression (Abeles et al., 2009). Through videos of case vignettes of adolescents experiencing similar symptoms as the participants, the programme tackled negative styles of thinking, difficulties with social relationships and symptoms of depression. After 8-12 weeks of treatment, adolescents had improved in their depressive symptomology in comparison to when they first started, and still maintained the improvements 3 months later, thus demonstrating the success of this computer based cognitive behavioural therapy

treatment (Abeles et al., 2009). The incorporation of such techniques within anti-bullying schemes could therefore help children to cope efficiently with the negative outcomes associated with bullying and reduce the risk for developing adjustment problems.

Overall this thesis had shown that bullying behaviours are prevalent in childhood, which is a developmentally sensitive period of time. These behaviours are associated with a lifetime of adversities and should therefore be targeted as early as possible. Intervention policies should take developmental mechanisms into consideration when designing programmes and involve all those who hold an influential role in children's development and social interactions (i.e. parents and teachers).

7.7 Future directions

In light of the findings from this research and its limitations, cognitive functioning appears to be a developmental mechanism underlying children's involvement in bullying and its harmful outcomes. This thesis primarily focused on ToM and cognitive attributional styles. However, other cognitive processes may also be of interest in relation to bullying. For example studies have shown that bullied children significantly vary from non-bullied children in their selection and use of coping strategies (Kochenderfer-Ladd & Skinner, 2002; Sandstorm, 2004). Variations in coping strategies have also been linked with adjustment problems (Reijntjes et al., 2006; Sandstorm, 2004). Therefore, as not all children who experience bullying victimisation develop adjustment problems (Bowes, Maughan, Caspi, Moffitt, & Arseneault, 2010), coping strategies could distinguish children who cope with this distressing experience from those who do not. The investigation into cognitive functioning as an underlying mechanism involved in children adjustment problems could be further developed, by employing longitudinal prospective study designs to test if coping strategies act as a mediator and explain why some bullied children go on to develop adjustment problems and other do not.

Previous studies from the E-Risk research team have shown individual differences in children's cognitive functioning (Koenen, Moffitt, Caspi, Taylor, & Purcell, 2003) and bullying behaviours (Ball et al., 2008; Bowes, et al., in press) are in part explained by genetic factors. The association between cognitive processing and children's bullying

behaviours reported in this thesis could be further explored by decomposing the genetic and environmental components shared by the two. For example if these association are in part explained by genetic factors then trying to improve children's cognitive functioning through taught lessons at school may not be enough. Rather, as genes in part influence environmental exposure through gene environment correlations (Plomin et al., 2001), parents may be contributing to children's genetic propensity for cognitive deficits through the environment they provide for their child (i.e. lack of stimulating materials such as books). By also incorporating the home environment to interventions focusing on improving children's cognitive functioning, the genetic risk of having cognitive deficits and being involved in bullying could be dampened.

Further to cognitive functioning being an underlying mechanism contributing to children's involvement in bullying, other developmental processes such as children's emotion processing skills may also be of interest for researchers. Children's ability to appropriately process the emotions evoked by environmental and social interactions aid their ability to understand and appropriately adapt to the social environment, therefore making it a crucial part of social interactions (Thomas, De, Graham, & LaBar, 2007). Atypical development in the ability to process emotions may influence the risk of being bullied by placing children in a position of vulnerability. For example, if children have difficulty in identifying negative emotions associated with bullying victimisation they may find it difficult to anticipate negative behaviours and find themselves in situations where bullying is highly likely. Alternatively, hypersensitivity to negative emotions may also contribute to children's anxiety, which in turn acts as a risk for being bullied (Hodges & Perry, 1999).

Emotion processing skills may also act as a mediating mechanism underlying the development of adjustment problems amongst children involved in bullying. The exposure to greater levels of negative emotional interactions (i.e. aggression, hostility) amongst bullied children may result in a sensitivity bias towards identifying negative emotions (i.e. anger), or a desensitisation effect. A number of studies have shown that maltreated children express greater sensitivity to negative facial expressions showing anger (Cicchetti & Curtis, 2005; Pollak, Messner, Kistler, & Cohn, 2009) and fear (Masten et al., 2008). As a number of adjustment problems are rooted in emotional disturbances (i.e. emotional problems), maladjustment in the regulation of emotions,

may be seen as a viable contributor to the development of adjustment problems, as it heightens one's risk of being susceptible to emotion based problems. Furthermore children's ability to accurately perceive anger is associated with their behavioural problems (Fine, Trentacosta, Izard, Mostow, & Campbell, 2004). It is thus plausible to suggest that bullied children may have a greater sensitivity towards negative emotions that may act as an underlying mechanism for the development of adjustment problems.

7.8 Conclusions

Children's involvement in bullying is shaped by their cognitive functioning over and above the influence of child-specific and family factors. Deficits in cognitive skills contribute towards the bullying 'profiles' adopted by children and are associated with their adjustment problems. The malleable characteristic of these skills in early childhood suggests that these can be targeted by interventions to attain maximum efficiency in minimising children's involvement in bullying. Furthermore by assisting children in the healthy development of cognitive skills, they can be equipped to effectively deal with the negative impact bullying behaviours have on their mental health. Collectively, results from this thesis support the active role of cognitive functioning as an underlying mechanism involved in shaping children's bullying 'profiles' and adjustment problems. Promoting and supporting positive cognitive development throughout childhood may not only help to reduce children's risk of being involved in bullying but may also help maintain healthy cognitive processing techniques that promote mental wellbeing.

CHAPTER EIGHT

8 References

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